THE AMERICAN STATISTICIAN

FEBRUARY, 1961

VOLUME 15 • NUMBER 1

University Microfilms
313 North First Street
Ann Arbor, Michigan A/Exch

Walter F. Willcox
A Statist Celebrates His One Hundredth Birthday
(See Pages 3 and 16)

ARTICLES

WALTER F. WILLCOX: STATIST *by William R. Leonard* 16

BAYESIAN STATISTICS *by F. J. Anscombe* 21

A NOTE ON THE DEMOGRAPHIC BASE OF HOUSEHOLD FORMATIONS IN THE 60's *by Arthur G. Auble* 25

STATEHOOD AND NATIONAL STATISTICS *by Robert C. Schmitt* 27

DEPARTMENTS

PRESIDENT'S COLUMN 1

NEWS 2

PERSONAL NEWS 7

INTERNATIONAL STATISTICAL ACTIVITIES 8

FEDERAL STATISTICAL ACTIVITIES 9

QUESTIONS AND ANSWERS 29
Reader Observations on Recent Discussions

CHAPTER NOTES 32

CHAPTER PRESIDENTS AND SECRETARIES Inside Back Cover

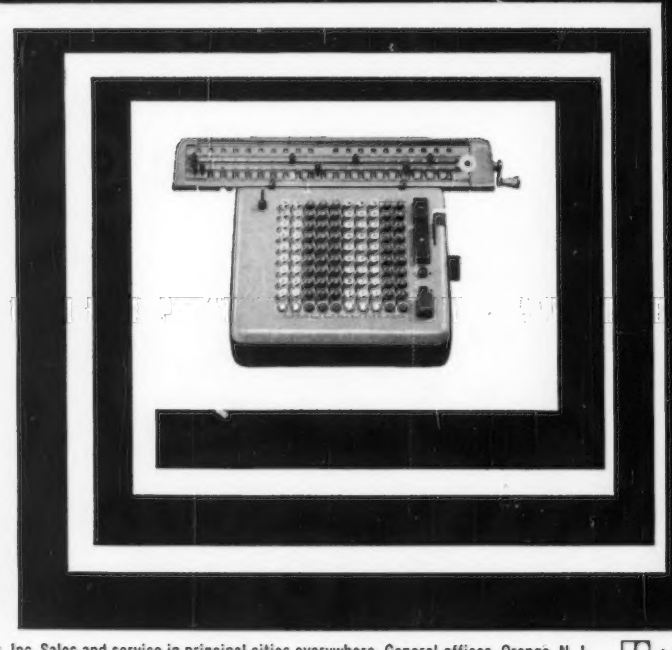
A PUBLICATION FOR THE STATISTICAL PROFESSION

NEW–*Another Achievement from Monroe*

Never before has so much calculator function been compacted into so small a unit. Or so low a price. This is LA-9, the newest, the ultimate in Monroe's famous L line calculators. This one's honored antecedents today are accomplishing their time and money saving missions on more desks in American business than any other calculator. LA-9 covers less area than a letterhead sheet, weighs less than 18 pounds. Yet this new compact automatically performs many of the jobs that much bigger and costlier machines do. Its peak performance is guaranteed and maintained by Monroe's nationwide service organization. And at so moderate a price, it can quickly pay for itself through its efficiencies.

for CALCULATING · ADDING · ACCOUNTING · DATA PROCESSING MACHINES

See the MAN from MONROE



Monroe Calculating Machine Company, Inc. Sales and service in principal cities everywhere. General offices, Orange, N. J.

A DIVISION OF LITTON INDUSTRIES

THE
AMERICAN STATISTICIAN

A publication for the statistical profession

FEBRUARY, 1961

Vol. XV, No. 1

Published by
The American Statistical Association

Founded 1839

EDITOR
MORRIS HAMBURG

ASSOCIATE EDITORS
GUENTHER BAUMGART
WILLIAM S. CONNOR
DAVID B. DUNCAN
J. E. MORTON
ALMARIN PHILLIPS
HARRY V. ROBERTS

DEPARTMENT EDITORS
News and Notes—DANA BARBOUR
Questions and Answers—ERNEST RUBIN
International Statistical Activities—
JOAN RAUP ROSENBLATT
Correspondent for Federal Statistical Activities
—MORRIS ULLMAN

OFFICERS OF THE AMERICAN STATISTICAL ASSOCIATION
President: MARTIN R. GAINSBRUGH
Past President: MORRIS H. HANSEN
President-Elect: PHILIP M. HAUSER
Vice-Presidents: GEORGE E. P. BOX, GEOFFREY H. MOORE, GUY H. ORCUTT

Directors: A. H. BOWKER, RAYMOND T. BOWMAN, HAROLD F. DORN, FREDERICK MOSTELLER, DOUGLAS G. CHAPMAN, DOROTHY M. GILFORD

Secretary-Treasurer and Executive Director: DONALD C. RILEY

Members of the Council: GEOFFREY BEALL, ROBERT J. BUEHLER, J. PARKER BURSK, HERBERT A. DAVID, ARTHUR M. DUTTON, CHURCHILL EISENHART, E. J. ENGQUIST, JR., W. T. FEDERER, S. M. FREE, JR., JOHN E. FREUND, RICHARD A. FREUND, MAURICE I. GERSHENSON, JOHN I. GRIFFIN, JAMES E. GRIZZLE, MORRIS HAMBURG, CLIFFORD G. HILDRETH, ROBERT G. HOOKE, J. STUART HUNTER, D. V. HUNTSBERGER, R. E. JOHNSON, NATHAN KEYFITZ, CLYDE Y. KRAMER, GERALD J. LIEBERMAN, ARTHUR S. LITTELL, HYMAN MENDUKE, PAUL D. MINTON, NATHAN MORRISON, GOTTFRIED E. NOETHER, LOUIS J. PARADISO, SAMUEL B. RICHMOND, ERNEST RUBIN, HARRY SHARP, WILLIAM H. SHAW, ALBERT T. SOMMERS, ROBERT B. SPEARS, CONRAD TAEUBER, MAX S. WEINSTEIN.

The Editorial Committee welcomes the submission of manuscripts for possible publication. Two copies, double-spaced, should be sent to the Editor, Morris Hamburg, E-241 Dietrich Hall, University of Pennsylvania, Philadelphia 4.

Correspondence concerning the separate departments should be sent to the Department Editor at the American Statistical Association, 1757 K Street, N.W., Washington 6, D. C.

Second class postage paid in Washington, D. C. *The American Statistician is published five times a year*—February, April, June, October and December—by the American Statistical Association, Business Office: 1757 K St., N. W., Washington 6, D. C. Subscription rate: one dollar and fifty cents a year or thirty-five cents per copy.

Anyone wishing to change his mailing address should allow eight weeks notice. A copy of the address taken from an issue of the periodical should accompany the change-of-address request.

The President's Column

A New Year

Martin R. Gainsbrugh

During the coming year, I want to discuss with you the programs and problems the Association will encounter in 1961. Our Association is an expanding organization with many facets. The year's agenda includes new steps that should be taken as well as the further development of programs instituted in the last few years. One of the most important of these is assisting in the closer collaboration among the many societies interested in statistics. Another, although it may sound routine, is the preparation of a new Directory. This is useful to statisticians working in many areas. A committee will soon be appointed to plan the questionnaire that will be mailed to all members. The present scheduling calls for the mailing of forms to the membership in the spring, with copies ready for distribution by early fall.

Each member of ASA will receive a free copy of the 1961 Membership Directory. This new edition will contain over 8,000 listings in the alphabetical section. It will show for each member his title, working affiliation, degrees (year and granting institution), sectional interests, plus other pertinent data to be determined by the committee.

(Continued on page 19)

Editor's Note

A number of changes in format have been introduced in this issue of THE AMERICAN STATISTICIAN, which we think are improvements and will be generally helpful to our readers. You undoubtedly have noticed the difference in the design of the cover. On the basis of a most unscientific, nonprobability sample of opinions of a small group of persons, we have concluded that the current design is aesthetically more appealing than the old one. A new subtitle, "A Publication for the Statistical Profession," reflects the fact that in recent years individuals and groups in other professional statistical organizations, as well as ASA, have increasingly been utilizing THE AMERICAN STATISTICIAN as a means of communicating items of interest to persons concerned with statistics. The little frill on the cover concerning Walter Willcox is special with this issue. We would be entirely willing to repeat this touch, however, upon learning of the 100th birthdays of other members of ASA. A number of modifications will be found in this issue, such as changes in the masthead, the type faces used for titles of articles, redesign of section headings, an increased use of pictures and the transfer of the list of Chapter officers to the inside back cover.

You have probably been aware of changes in recent years in the substantive content of THE AMERICAN STATISTICIAN. It has gradually shifted from a predominantly "news" organ to a "news-professional-education" periodical. We have tried to obtain a more international coverage of statistical activities. Two steps in this direction were the addition of the International Statistical Activities section a couple years ago and the running of a continuing series of articles on the teaching and development of statistics in foreign countries. There has also been a fairly major reworking of the entire News Section in an attempt to make the published material more pertinent and "newsy."

We welcome your reactions to our activities and particularly invite your suggestions concerning how this publication may be made relevant and helpful to you.

MORRIS HAMBURG

American Statistical Association Elects National Officers and Section Heads

The following national officers were elected in the balloting last fall:

President-Elect: PHILIP M. HAUSER, *University of Chicago*

Vice-President (1961-63): GEOFFREY H. MOORE, *National Bureau of Economic Research*

Directors (1961-63): Douglas G. Chapman, *University of Washington*, Dorothy M. Gilford, *Office of Naval Research.*

Representative-at-Large (1961-62): William H. Shaw, *E. I. du Pont de Nemours and Co.*

District Representatives on ASA Council (1961-62):

District No. 1: GOTTFRIED E. NOETHER, *Boston University, Boston, Mass.*

District No. 2: MAX S. WEINSTEIN, *State of New York Employees' Retirement System, Albany, N.Y.*

District No. 3: NATHAN MORRISON, *New York State Department of Labor, New York City*

District No. 4: HYMAN MENDUKE, *Jefferson Medical College, Philadelphia*

District No. 5: ERNEST RUBIN, *U. S. Department of Commerce, Washington, D. C.*

District No. 6: JAMES E. GRIZZLE, *University of North Carolina, Chapel Hill, N.C.*

District No. 7: HARRY SHARP, *Detroit Area Study and University of Michigan, Ann Arbor, Mich.*

District No. 8: ROBERT J. BUEHLER, *Iowa State College, Ames Iowa*

District No. 9: PAUL D. MINTON, *Southern Methodist University, Dallas, Texas*

District No. 10: JOHN E. FREUND, *Arizona State College, Tempe, Ariz.*

Sectional representatives on the Council have been designated by the Sections. The Biometrics Section has reappointed its Chairman, Arthur M. Dutton, University of Rochester, and has appointed its Chairman-Elect, Clyde Y. Kramer, Virginia Polytechnic Institute, as its new representative. The Business and Economic Statistics Section has reappointed its Chairman, Louis J. Paradiso, Department of Commerce, and the Section's Program Chairman, Albert T. Sommers, National Industrial Conference Board, as its new representative. Representatives of the Section on Physical and Engineering Sciences are its Chairman, Gerald J. Lieberman, Stanford University, who has been reappointed, and its Chairman-Elect, Churchill Eisenhart, National Bureau of Standards. The Social Statistics Section has elected its Chairman-Elect, Conrad Taeuber, Bureau of the Census, as its new representative, and has redesignated its Chairman, Nathan Keyfitz, University of Toronto. The Section on Training of Statisticians has reappointed its Chairman, J. Parker Bursk, University of Pennsylvania, and has selected its Chairman-Elect, Samuel B. Richmond, Columbia University, as well.

Both its representatives to the Council have been reappointed by the Biometric Society—ENAR, which is affiliated with the American Statistical Association. These are Walter T. Federer, Cornell University, and Spencer M. Free, Jr., Smith, Kline and French Laboratories.

The complete list of officers, including the continuing officers as well as those newly-elected, appears on the first page of this issue.

Section Officers Elected

Biometrics Section:

Chairman-Elect: CLYDE Y. KRAMER, *Virginia Polytechnic Inst.*

Secretary: FOSTER B. CADY, JR., *Iowa State University*

Executive Committee (1961-63): SEYMOUR GEISSER, *National Institute of Mental Health;* MARVIN A. KASTENBAUM, *Oak Ridge National Laboratory*

The continuing officers of the Section are Arthur M. Dutton, Chairman, and the following members of the Executive Committee: Donald Mainland, Jack I. Northam, Harry Smith, Jr., and Marvin Zelen.

Business and Economic Statistics Section:

Chairman-Elect: ROBERT E. JOHNSON, *Western Electric Company*

Secretary-Treasurer: KENNETH M. WRIGHT, *First National City Bank of New York*

Program Chairman-Elect: ALBERT T. SOMMERS, *National Industrial Conference Board*

Publications Chairman: EDMUND A. MENNIS, *Wellington Management Fund*

Regional Activities Chairman: MILLARD HASTAY, *Washington State University*

Continuing officers are Louis J. Paradiso, Chairman, and Sidney E. Rolfe, Program Chairman.

Section on Physical and Engineering Sciences:

Chairman-Elect: CHURCHILL EISENHART, *National Bureau of Standards*

Secretary: ALFRED LIEBERMAN, *Weapons System Evaluation Group*

The Section's only continuing officer is G. J. Lieberman, Chairman.

Social Statistics Section:

Chairman-Elect: CONRAD TAEUBER, *Bureau of the Census*

Vice-Chairman: MAURICE I. GERSHENSON, *California Department of Industrial Relations*

The continuing officers are Nathan Keyfitz, Chairman, Thomas J. Mills, Vice-Chairman, and Eli S. Marks, Secretary.

Section on Training of Statisticians:

Chairman-Elect: SAMUEL B. RICHMOND, *Columbia University*

Executive Committee (1961-62): FELIX E. MOORE, *University of Michigan;* FRANK J. WILLIAMS, *San Francisco State College*

Continuing officers of the Section are J. Parker Bursk, Chairman, and the following members of the Executive Committee: William Jackson Hall, Leslie Kish, R. Clay Sprowls.

Meetings to Honor Walter F. Wilcox

In order to honor Walter F. Willcox on his hundredth birthday, a number of statistical organizations which have spring meetings have arranged to hold them at Cornell University on April 20, 21 and 22, (about one month after Dr. Willcox' birthday). The meetings now scheduled include the eastern region meeting of the Institute of Mathematical Statistics, the meeting of the Biometrics Society (ENAR), the Biometrics Section, the Section on Physical and Engineering Sciences and the Social Statistics Section of the American Statistical Association, and possibly others. The programs for these meetings and many details are now being arranged.

Professor Emeritus Willcox was at one time Director of the Bureau of the Census, President of the American Statistical Association in 1912, and for many years a leader in the development of statistics which could be used to facilitate social and economic progress throughout the world. A special session in recognition of his interests has been arranged by the Social Statistics Section of the ASA as follows:

THE FIRST SIXTY YEARS OF THE CENSUS BUREAU

Chairman: Robert W. Burgess, Director

Impact of Research and Development on Census Methods in the 20th Century: Morris H. Hansen, William N. Hurwitz and Joseph F. Daly, Census Bureau

Developments in the Analysis and Use of Census Data, 1900-1960: Conrad Taeuber, Census Bureau

Remarks: Walter F. Willcox

It will probably be held on Friday evening, April 21, 1961. The local arrangements committee is organizing a reception and cocktail party in honor of Professor Willcox for Thursday evening.

Transient accommodations are limited in Ithaca at this time of year, but priority for a number of rooms is available for those who make reservations before April 1, 1961. The following have rooms for Thursday, Friday and Saturday:

Hillside Tourist Inn, 518 Stewart Avenue—

A very large and good tourist home adjacent to campus. Wide variety of accommodations. Single with bath $5. Twin with bath $8.

Ithaca Hotel—

A downtown hotel. Dining room Duncan Hines approved. Singles $7-8. Doubles $12-14.

Cornell Heights Residential Club, 1 Country Club Road—

Only ten excellent twin-bedded rooms available. Close to campus.

Collegetown Motor Lodge, 312 College Avenue—

Ten excellent rooms available. Close to campus. March 15th deadline.

Spring Water Motel, Varna, New York—

Small (twelve rooms) but well run. Car needed.

Willard Straight Hall at Cornell—

On campus. Limited accomodations.

Reservations should be made directly with the listed accommodation. The local arrangements chairman, Professor Isadore Blumen, 320 Warren Hall, Cornell University, will be glad to act on your behalf if there is any difficulty.

An additional but separate occasion in honor of Professor Willcox will be a dinner to be held in Washington at the Cosmos Club on April 15, 1961, sponsored by a committee consisting of Stuart A. Rice (Chairman), Senator Paul H. Douglas, A. Ross Eckler, Judge Henry W. Edgerton, Justice Felix Frankfurter, Roger W. Jones and Donald C. Riley.

Continental Classroom Television Course

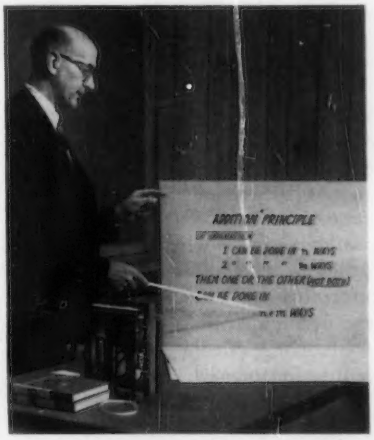
The course in Probability and Statistics, which was announced in the Executive Director's letter of December 1, 1960 to ASA members, is attracting a good deal of interest among statisticians. This course is being presented by the Learning Resources Institute in cooperation with the Conference Board of the Mathematical Sciences, and is telecast by the National Broadcasting Company.

Probability and Statistics is being taught by Professor Frederick Mosteller, Chairman of the Department of Statistics, Harvard University, and Professor Paul S. Clifford, Professor of Mathematics at Montclair (N. J.) State College. Professor Mosteller is

Frederick Mosteller, head of the Department of Mathematical Statistics, Harvard University.

a member of the ASA Board of Directors, and Professor Clifford is Chairman of the ASA Committee on Audio-Visual Aids. Both are Fellows of the Association.

The course includes the following: counting problems, probability theory in finite sample spaces, random numbers and their uses, random variables, expectations, means, variances, binomial and normal distributions, random walk problems, point estimation, confidence limits, hypothesis testing, applications of Bayes' theorem, sums of independent random variables, law of large numbers, and central limit theorem. More than 300 colleges and universities are offering the course for college credit. It is being carried by 170 stations throughout the nation, from 6:30 to 7 a.m. in each time zone, Monday through Friday. Students seeking undergraduate



Paul Clifford, professor of mathematics, Montclair (N.J.) State College.

credit view the lessons taught Monday, Wednesday and Friday by Professor Mosteller. Teachers and others enrolled for graduate credit view additional lessons on Tuesday and Thursday, devoted to classroom teaching and problem-solving. These sessions are conducted by Professor Clifford.

This is the third year of education through a television network, Continental Classroom having been established in 1958 to help meet the critical lag in qualified science instruction. Courses were previously presented in Atomic Age Physics and Modern Chemistry. During the first semester of the 1960-61 year, a course in Modern Algebra was given.

Additional information about the course in Probability and Statistics or about the Continental Classroom may be obtained from Dr. John J. Kelley, National Coordinator, Continental Classroom, 680 5th Avenue, New York City.

8th Midwest Conference

An outstanding program is being planned for the eighth annual Midwest Conference on Statistics scheduled for March 17 and 18, 1961 at the Congress Hotel, Chicago. The general theme of the Conference, which is co-sponsored by the Chicago Chapter of the American Statistical Association and the Chicago Association of Commerce and Industry, is "Planning for Profits." To meet the needs of the individual to become more familiar with the techniques and procedures of planning, the conference has scheduled a series of talks on basic planning concepts and applications. Well known authorities will discuss planning goals, organizing for planning, forecasting, the problems encountered in planning for growth, the integration of corporate planning functions, and the merits and pitfalls of the planning process. The effectiveness of various methods in solving real business problems will be appropriately demonstrated by each speaker through the use of specific examples and case studies. Applicable statistical tools will be introduced.

Concurrent with talks on basic concepts and applications will be two advanced technical discussion sessions, to serve the advanced practitioner and the consultants who want to expand their knowledge, have their questions answered and make themselves more valuable to their companies and clients. Many professional statisticians and researchers have occasion to resolve crucial planning problems by simulating company operations via mathematical models as well as other advanced statistical techniques. In the developmental stages of any scientific method, as in this technique, there is a need to exchange new findings, new refinements, and new applications. The speakers scheduled for these technical sessions bring with them a vast amount of experience in the business application of advanced statistical theory.

On Saturday, March 18th at the Morton Salt Building an optional feature of the Conference will be offered. Conference attendees will have the chance actually to participate in a Management Planning Game—to make management decisions and see the effect of these decisions on their "company" and its position in the "market." A computer will be used to interpret these decisions in an all-day Saturday session.

Further information may be obtained from Joseph Rabin, General Chairman of the Conference, at Paper Mate Company, 444 Merchandise Mart, Chicago 54, Ill.

1961 Annual Meeting Plans

The 121st Annual Meeting of the American Statistical Association will be held at the Roosevelt Hotel in New York City, December 27-30, 1961. Other associations meeting jointly with the ASA in New York City include the Institute of Mathematical Statistics, the Biometric Society (ENAR), the American Economic Association, the Econometric Society, the American Marketing Association and others.

The Program Committee for the 1961 Annual Meeting is already at work. The Chairman of this Committee is George P. Hitchings, American Airlines. The Section Representatives are: Eli S. Marks. National Analysts, Inc. (Social Statistics Section); Albert T. Sommers, National Industrial Conference Board, Inc. (Business and Economic Statistics Section); Arthur M. Dutton, University of Rochester (Biometrics Section); Samuel B. Richmond, Columbia University (Section on Training); and Ray B. Murphy, Bell Telephone Laboratories (Section on Physical and Engineering Sciences). The Committee will welcome suggestions for sessions or papers.

Robert E. Johnson, Western Electric Company, has been appointed Chairman of the Local Arrangements Committee. At the time this issue went to press, the other members had not yet been designated.

New Officers of the Biometric Society (ENAR)

The newly-elected officers of the Eastern North American Region of the Biometric Society are:

Regional President-Elect: HENRY L. LUCAS, JR., *Institute of Statistics*, North Carolina State College, Raleigh, North Carolina

Regional Secretary: ERWIN L. LECLERG, *Biometric Services, Plant Industry Station*, Beltsville, Maryland

Regional Treasurer: DONALD A. GARDINER, Oak Ridge, Tenn.

Regional Committee (1961-63): ROBERT J. MONROE, *Institute of Statistics, North Carolina State College*

VIRGIL L. ANDERSON, *Statistical Laboratory, Purdue University*

The Regional President of the Society for 1961 is Oscar Kempthorne, Statistical Laboratory, Iowa State College.

Business Economists Annual Meeting Held

The second annual meeting of the National Association of Business Economists was held October 19-20 at the Loeb Student Center of New York University. More than 200 members were present. This represented an increase of 60% over the attendance at the first meeting of this organization in November, 1959.

A special feature of the meeting was an address by Vice-President Nixon on the morning of the 20th, in which he outlined his views on important economic questions of the day. The Association was particularly honored to have him present in view of his intense campaign activities at the time.

The meeting began with a lunch-

eon on the 19th, at which Joe Livingston of the Philadelphia Bulletin discussed "The Election and the Business Outlook." The afternoon session that day was devoted to "Foreign Economic Developments—Their Analysis and Meaning," with William Butler of the Chase Manhattan Bank as Chairman. The speaker at dinner that evening was Alan Greenspan, President of Townsend and Greenspan, who talked on "The Business of Business Economics."

The morning session on the 20th—in addition to the talk by Mr. Nixon—was devoted to the subject "Nonforecasting Activities of Business Economists." Robert Johnson of Western Electric Company was Chairman of this session. The forecast luncheon that day was presided over by Dexter Keezer of McGraw-Hill, who provided twelve experts to present brief pinpoint forecasts for specific industries for 1961. The afternoon session dealt with the general topic of "Industry Problems and Prospects in the 1960's." This subject was discussed from the viewpoint of consumer products, industrial products, and the financial environment, at three panels.

Persons interested may receive summaries of the papers presented at this meeting by writing to Charles B. Reeder, Economist's Office, Room 9058 Du Pont Building, E. I. du Pont de Nemours, Wilmington 98, Delaware.

At a business meeting prior to the general sessions, the result of the election of officers and Council members was announced. The officers elected for the current year are: President — George Cline Smith, Vice-President and Chief Economist of F. W. Dodge Corporation; Vice-President—Lester S. Kellogg, Director of Economic Research, Deere & Co.; Secretary—Charles B. Reeder, E. I. du Pont de Nemours and Co., and Treasurer — Sidney E. Rolfe, President Agora Development Corp.

In addition, the following persons were elected to the Council of the Association: William F. Butler, William P. Carlin, Ira T. Ellis, Dexter M. Keezer, Joseph A. Livingston, Arthur S. Rosenbaum, Robert P. Ulin, Willis Winn.

The first copies of N.A.B.E.'s Technical Publication Service and announcements regarding the inauguration of a Placement Service were distributed at the meeting.

Sessions on Reliability

The Electronics Division of the American Society for Quality Control and the Section on Engineering and Physical Sciences of the American Statistical Association are sponsoring a conference on "Mathematics and Statistics for Reliability Problems," to be held at New York University on March 27 and 28, 1961. The program is being planned to be of especial value to people involved in technical aspects of reliability.

Several sessions are being provided for the presentation of contributed papers. Those who feel that they have ideas or experiences of interest are invited to submit, preferably by March 1, 1961, one-hundred word abstracts of papers to the program chairman William A. Glenn, Research Triangle Institute, Post Office Box 490, Durham, North Carolina. Contributed papers should be limited to fifteen minutes.

Quality Control Clinic

The Rochester Section of the American Society for Quality Control is sponsoring the 17th Annual Quality Control Clinic, to be held March 28, 1961 at the University of Rochester, Rochester, New York. Twenty technical papers covering all phases of quality control and industrial statistics will be presented.

Further information may be obtained from Professor Albert D. Rickmers, School of Photography, Rochester Institute of Technology, 65 Plymouth Avenue, South, Rochester 8, New York.

Graduate Fellowships

The Laboratory of Experimental Design in Education of the University of Wisconsin offers, under Title IV of the National Defense Education Act, four three-year graduate fellowships in statistics applied to education, beginning in September of 1961.

Stipends—usually free of income taxes—are $2000 for the first year of graduate study, $2200 for the second year, and $2400 for the third, plus $400 for each year for each dependent. Renewal the second and third years is contingent upon satisfactory progress toward the Ph.D.

Academically superior students with considerable preparation in mathematics who will begin their graduate work next summer or fall are sought as contenders for these fellowships. The prime requirement is aptitude for experimental statistics. Fellows will take some courses in the University of Wisconsin Departments of Mathematics, Statistics, and Psychology. Interested persons should write to Prof. Julian C. Stanley, Education Building, University of Wisconsin, Madison 6, Wisconsin, as soon as possible, setting forth their qualifications fairly fully.

Training Grants at C. U.

The Statistical Laboratory of the Catholic University of America has been awarded a grant by the National Institutes of Health for training in the field of biometry.

The stipends for first year graduate students are $2250.00 plus tuition. Family allowances for dependents and annual increases are provided.

The students will pursue the same general program as other students in mathematical statistics. They will participate in the consulting activities of the laboratory and will be required to attend some courses in the biological sciences or other fields relevant to the study of biometry.

In addition to the grants in biometry, there are also fellowships under the National Defense Education Act available. Some appointments to graduate assistantships and research assistantships will also be made.

Requests for further information and application forms should be addressed to Professor Eugene Lukacs, Director, Statistical Laboratory, The Catholic University of America, Washington 17, D. C.

Summer Session in Statistics

The 1961 Southern Regional Graduate Summer Session in Statistics will be held at the Virginia Polytechnic Institute, Blacksburg, Virginia, from June 15 to July 22, 1961. The Virginia Polytechnic Institute, Oklahoma State University, North Carolina State College, and the Uni-

versity of Florida have agreed to operate a continuing program of graduate summer sessions in statistics to be held at each institution in rotation. The program was instituted at Virginia Polytechnic Institute in the summer of 1954.

The 1961 session, like previous sessions under this program, is intended to serve: 1) teachers of statistics and mathematics; 2) professional workers who want formal training in modern statistics; 3) research and engineering personnel who want intensive instruction in basic statistical concepts and modern statistical methodology; 4) Public Health statisticians who wish to keep informed about advanced specialized theory and methods; 5) prospective candidates for graduate degrees in statistics; and 6) graduate students in other fields who desire supporting work in statistics.

The session will last six weeks and courses will carry five quarter hours of credit. Not more than two courses may be taken for credit at any one session. The summer work in statistics may be applied as residence credit at any of the cooperating institutions, as well as certain other universities, in partial fulfillment of the requirements for a graduate degree. The program may be entered at any session, and consecutive courses will follow in successive summers so that it would be possible for a student to complete the course work in statistics for a Master's degree in three summers. Students must satisfy the remaining requirements for course work and thesis at the institution where they are to be admitted to candidacy. The advanced courses may be accepted as part of the Ph. D. program of the participating institutions.

A limited number of fellowships will be available for applicants from certain specialized areas. Doctoral courtesy will be honored for those holding Ph. D. or M.D. degrees.

The courses to be offered in statistics in 1961 at the Virginia Polytechnic Institute are as follows: Statistical Methods, Sampling Theory; Applied Statistics for Engineers and Physical Sciences; Theory I, Probability; Theory II, Statistical Inference; Theory III, Theory of Linear Hypotheses; Non-parametric Methods; and Multivariate Methods. A number of courses in advanced mathematics will also be available during the Summer Session. A series of Colloquia involving recent developments in statistical theory and methods will be conducted during the special Summer Session.

Requests for application blanks for the summer session and for fellowships should be addressed to Dr. Boyd Harshbarger, Head, Department of Statistics, Virginia Polytechnic Institute, Blacksburg, Va.

New Statistics Curriculum

The Mathematics Department of the University of Nebraska has announced the introduction of a curriculum leading to the M.A. or M.S. and Ph. D. degrees in Statistics. A bachelor's degree program in Statistics is also under consideration at present. Courses are offered in Statistical Methods, Statistics for Engineers, Theory of Probability, Information Theory, Methods of Experimental Design, Stochastic Processes, Theory of Games and Statistical Decision Theory, and Topics in Probability and Statistics. Additional courses will be added as needed. A number of assistantships and fellowships are available to qualified students. Information concerning degree requirements and assistantships may be obtained from Professor Bernard Harris, Department of Mathematics, University of Nebraska, Lincoln 8, Nebraska.

Iowa State Summer Courses

The Department of Statistics at Iowa State University will offer eight applied courses in statistical theory and methods in its two 1961 summer sessions. These courses are planned primarily for graduate students or research workers with limited mathematical backgrounds who wish to use statistical techniques intelligently for application to other fields. In addition, a course on special topics in theoretical or applied statistics may be studied at the graduate level. Senior staff members will be available during most of the summer for consultations on research or special problems.

Students may register for either or both of the six-week summer sessions: June 5-July 12 and July 12-August 18. The complete list of statistics offerings for the first session is as follows: Stat. 401, "Statistical Methods for Research Workers" (at the level of Snedecor's *Statistical Methods*); Stat. 447, "Statistical Theory for Research Workers" (mainly theory of experimental statistics at the level of Anderson and Bancroft's "*Statistical Theory in Research*"; Stat. 411, "Experimental Designs for Research Workers"; Stat. 599, "Special Topics"; Stat. 599A1, "Topics in Foundations of Probability and Statistics"; and Stat. 699, "Research." In the second session will be offered Stat. 402, a continuation of 401; Stat. 448, a continuation of 447; Stat. 421, "Survey Designs for Research Workers"; Stat. 599, Stat. 599A2, "Intermediate Applied Decision Theory (at the level of Blackwell and Girshick, *Theory of Games and Statistical Decisions*), and Stat. 699.

NSF Summer Institute

The National Science Foundation will sponsor a Summer Institute for College Teachers of Statistics at Iowa State University for the 11-week period from June 5 through August 18, 1961. The Departments of Statistics of three other universities, Kansas State, Utah State and the University of Wyoming, are cooperating with Iowa State's statistical center in presenting this Institute.

Financial support in the form of stipends, dependency allowances and travel allowances will be awarded to 50 eligible applicants. All American college and university teachers who are, or who during the 1961-62 academic year will be, required to teach one or more courses in statistics as part of their regular assignments are eligible.

The Institute is planned to provide additional basic training in statistics for present and prospective teachers who, though well-grounded in other fields, have limited backgrounds in statistics. Also it will provide more advanced courses and seminars designed to keep college and university teachers abreast of developments.

Courses are scheduled in Statistical Methods, Theory of Statistics, Experimental Design, Survey Designs, Topics in Foundations of Probability and Statistics, and In-

termediate Applied Decision Theory. In addition, an opportunity will be provided for those interested to observe a demonstration class in Principles of Statistics at the undergraduate level. The faculty will include the Institute director, Dr. T. A. Bancroft, Director of the Iowa State University Statistical Laboratory and head, Department of Statistics; Dr. R. J. Buehler, Associate Professor of Statistics, Iowa State University; Dr. H. T. David, Associate Professor of Statistics, Iowa State University; Dr. H. C. Fryer, head of the Department of Statistics and Statistical Laboratory Director, Kansas State University; Dr. H. O. Hartley, Professor of Statistics, Iowa State University; the Institute Associate Director, Dr. D. V. Huntsberger, Associate Professor of Statistics, Iowa State University; and Dr. R. L. Hurst, head of the Department of Applied Statistics and Statistical Laboratory Director, Utah State University. Guest lecturers will present special seminars.

Requests for information or application forms should be addressed to: The Director, Summer Institute in Statistics, 102 Service Building, Iowa State University, Ames, Iowa.

Penna. Statistical Abstract

Publication of the *1960 Pennsylvania Statistical Abstract* has been announced by the Bureau of Statistics of the Pennsylvania Department of Internal Affairs. This third annual edition has been substantially increased in size and scope over the 1959 issue with the addition of 96 pages and six new sections. Now divided into 30 subject areas, the new Abstract includes previously unpublished data on local elections and registration, the financing of private welfare, the workload of courts, the availability of civil-defense personnel, and a variety of other subjects. The section on local planning, redevelopment, and authorities has been expanded to include planning; that on prices to include consumer expenditures. Material on veterans' benefits has been joined with the section on social insurance and financial assistance, while military affairs, formerly treated along with benefits to veterans, has been combined this year with civil defense.

In broadening its scope in the 1960 edition of the Abstract, the Bureau of Statistics has collected material from a multitude of sources both in and out of government to provide the greatest possible coverage of Commonwealth activities and conditions. Thirty-five graph and map diagrams are included, together with explanatory and informational notes, and references to other sources.

The *1960 Pennsylvania Statistical Abstract* may be bought for $1.56 from the Bureau of Publications, Department of Property and Supplies, Tenth and Market Streets, Harrisburg, Pennsylvania. Checks or money orders made payable to the Commonwealth of Pennsylvania

PERSONAL NEWS

SIDNEY ADDELMAN received his Ph.D. degree in Statistics from Iowa State University in November 1960 and has joined the staff of the Research Triangle Institute, Durham, North Carolina.

MILDRED ALLEN, formerly head of the Government Surveys Program in the Office of Special Studies, National Science Foundation, is now head of the Program Analysis Unit, Biological and Medical Sciences Division.

GERTRUDE BANCROFT, Assistant Chief for Employment and Labor Force Analysis, Division of Manpower and Employment Statistics, Bureau of Labor Statistics, was given the Meritorious Service Award of the Department of Labor for her achievements in developing the Department's program of research on the labor force, employment and unemployment.

JOSEPH A. BECKER, formerly Director of Statistics, Foreign Agricultural Service, USDA, and Mrs. Becker returned recently to their home in Bethesda, Maryland after an eight-month auto tour of Europe.

W. J. CHAMBERLAIN of General Foods Corporation has been promoted to Administrator of Commodity Price Analysis, Corporate Purchasing Department, White Plains, New York. He was formerly Quality Control Manager of the Kankakee Operations of the Post Cereal Division.

I. M. CHAUDHRY is now at the University of Massachusetts as Instructor in the Department of Economics.

THEODORE COLTON received his Sc.D. in Hygiene from the Biostatistics Department of the Johns Hopkins School of Hygiene and Public Health in September 1960. Dr. Colton is now in the Department of Medical Statistics at the London School of Hygiene and Tropical Medicine on a National Science Foundation Postdoctoral Research Fellowship.

GERARD H. CORMIER has returned as Chief of the Section of Consumer Price Indexes, Bureau of Labor Statistics, after spending a number of years in the Division of Foreign Labor Conditions and Division of Manpower and Employment Statistics.

GERTRUDE M. COX, North Carolina State College and a former President of ASA, was recently given the 1960 Gamma Sigma Delta Award for Distinguished Service to Agriculture.

SIDNEY DEMSKEY has taken a position with Reliability Operations at General Electric Missile and Space Vehicle Department, Philadelphia. His responsibilities include reliability evaluation and statistical consultation.

WILLIAM P. DOOLEY has been appointed Marketing Specialist in the Commercial Development Division of Sun Oil Company's Research and Engineering Department. Previously, he was with the Kuljian Corporation, where he was Chief Chemist.

EDWARD E. EMANUEL, a graduate student in Statistics at the University of Pennsylvania, has been appointed Instructor of Statistics in the Wharton School.

PHILIP E. ENTERLINE has been designated as Reports Control Officer in the Public Health Service.

HENRY K. GENSLER is now employed by the Johns-Manville Fiber Glass Division in Toledo, Ohio as Quality Control Engineer-Statistics. His work is concerned with the analysis of engineering data from the viewpoint of quality control, with emphasis on process capabilities of equipment and sampling and inspection planning.

WILLIAM C. GEORGE, formerly Assistant Chief of the Foreign Trade Division, Bureau of the Census, is now on a detail to the International Cooperation Administration as Statistician-Economist Consultant pending an overseas assignment.

LEO A. GOODMAN is a Visiting Professor of Mathematical Statistics and Sociology at Columbia University during 1960-61 on leave of absence from his position as Professor of Statistics and Sociology at the University of Chicago.

ALOYSIA M. GORMAN has joined the faculty of Richmond Professional Institute, Colleges of William and Mary, as an Associate Professor of Psychology.

LEON GREENBERG, Chief of the Division of Productivity and Technological Developments, Bureau of Labor Statistics, was given a Distinguished Service Award by the Secretary of Labor "for leadership in the measurement of productivity and in the study of its human, social, and economic impacts."

WILLIAM GRODOWITZ has joined the Office of Operations Analysis at Headquarters USAF in the Pentagon. He was, for the past three years, a member of the

(Continued Page 35)

INTERNATIONAL STATISTICAL ACTIVITIES

Argentina

The School of Economics (FCE) of the UNIVERSITY OF BUENOS AIRES has opened courses leading to the degree of "Statistical Analyst" oriented toward the economic sciences. The courses are open to graduate students with a Ph.D. in economics, a degree in Public Accounting, Actuarial specialization and the equivalent of a Masters degree in Political Economics and Administration.

The curriculum comprises the following: Mathematics (I and II); Numerical Analysis and special methods of Calculus; Statistical Theory (I and II); Econometrics; and a Seminar on statistical techniques. The first six courses must be taken together with laboratory practice. A research paper must be submitted as a requirement for graduation.——*Inter American Statistical Institute*

Hungary

A new *Statistical Dictionary in Seven Languages* has been announced by the Hungarian CENTRAL STATISTICAL OFFICE. Published in October 1960, the dictionary comprises 1700 expressions in the field of statistics and related areas, in Russian, Hungarian, Bulgarian, Czech., Polish, German, and English. The book is intended to be a useful handbook for statisticians and economists.

Besides Hungarian statisticians and research workers, several statistical institutes in other countries took part in the compilation of the dictionary. It is a volume of 180 pages, including introduction and bibliography, bound in stiff covers. The dictionary is available for $7.00 from: "Kultura", Hungarian Trading Company for Books and Newspapers, P. O. B. 149, Budapest 62, Hungary——*"Kultura", Budapest*

India

Beginning in 1960, the INDIAN STATISTICAL INSTITUTE has been empowered to confer degrees. In addition to the training courses and examinations which were conducted formerly and will continue, the Institute will establish programs leading to the two "professional" degrees of Bachelor of Statistics (B. Stat.) and Master of Statistics (M. Stat.), and to the two higher degrees of Ph.D. and D. Sc.——*Calcutta Statistical Association Bulletin*

The Indian Statistical Institute announces that SANKHYA: THE INDIAN JOURNAL OF STATISTICS will be published in two separate series beginning from Volume 23. *Series 'A'* will contain mainly theoretical papers and notes on new methods and techniques. *Series 'B'* will contain papers in applied statistics consisting of original data, records and applications of new methods. Each series will contain about 400 pages per volume.

The subscription price (for U.S. and Canada) is $10.00 each for the separate volumes or $18.00 for both series taken together.——*Indian Statistical Institute, Calcutta*

A PRELIMINARY CONFERENCE OF INDIAN ECONOMETRICIANS was convened by three Indian members of the Econometric Society, at the Indian Statistical Institute during January 28-30, 1960. Thirty delegates attended from several Universities, the Indian Statistical Institute, the Central Statistical Organization, and the Reserve Bank of India. In all 23 papers were presented.

The purpose of the conference was to coordinate and promote the quality of research work in econometrics in India. While it was decided not to start a fresh society at this stage, it was planned that further conferences would be held and that compilations would be made of the names, institutions and bibliographies of econometric workers in India. A committee to arrange future conferences comprises Dr. N. S. R. Sastry, Prof. K. Nagabhusana, Dr. Uttam Chand, Dr. C. R. Rao, Mr. M. Mukherjee, and Mr. N. S. Iyengar (Secretary).

It was agreed that the term "econometrics" should not be understood in a very narrow sense; all work in applied economics involving some amount of use of mathematical models analysis should be considered as work in econometrics.——*Calcutta Statistical Association Bulletin*

Actuaries Brussels Meeting

The 16th International Congress of Actuaries was held in Brussels, June 15-22, 1960. The major subjects on the agenda were as follows: (1) Additional Benefits in Life Policies, (2) Effect of Variation of Technical Bases on the Financing of Social Insurance and of Pension Funds on an Assessment Basis, (3) "Excess of Loss" Reinsurance, (4) Motor Accident Insurance, (5) Statistical Theory of Sampling, (6) Trend of Mortality. A large number of papers were presented and, along with summaries of discussions, will

SUPPLEMENTARY LIST OF VISITING SCHOLARS

Name	Home Country	Host Institution	Period of Visit
ARI, Oguz Necip	Turkey	Univ. of Michigan	Sep. 60-July 61
BAIN, Andrew David	United Kingdom	Yale University	Aug. 60-Aug. 61
DOSSER, D. G. M.	United Kingdom	Univ. of Washington	Sep. 60-Sep. 61
INADA, Ken-ichi	Japan	Stanford Univ.	Sep. 60-Sep. 61
KAJI, Motoo	Japan	Stanford Univ.	Sep. 60-June 61
MARRIS, Robert L.	United Kingdom	U. of California	Feb. 61-July 61
MIYASAWA, Koichi	Japan	Princeton Univ.	Sep. 60-June 61
MORIGUTI, S.	Japan	Columbia Univ.	1960-61
NAKAMURA, Mitsugu	Japan	U. of Pennsylvania	Sep. 59-July 61
OKTABA, Wiktor	Poland	Iowa State Univ.	1960-61
PEARSON, E. S.	United Kingdom	Princeton Univ.	Spring 1961
RAO, P. V.	India	Univ. of Georgia	1960-61

be published in the formal *Proceedings.*

Of particular interest to statisticians are the following papers that were presented on the fifth topic:

On the Efficiency of the Sample Method in the Determination of the Mathematical Reserve of a Life Assurance Enterprise. R. Cacciafesta (Italy).

The Simulation of Experiences and the Theory of Statistical Sampling. E. Franckx (Belgium).

Application of the Monte Carlo Method to the Valuation of a Portfolio. J. de Jager (Netherlands).

Estimation of Risk Intensities by Means of Sampling. J. Jung (Sweden).

On Certain Aspects of Variance in the Theory of Sampling. M. Laguilhaumie (France).

Recession of Population Characteristics in Ruanda-Urundi. H. Ledoux (Belgium).

On the Approximation of the Mathematical Reserve Calculation Relating to the Policies of a Life Insurance Company When Applying the Sampling Method. G. Ottaviani (Italy).

Precision of Ratio Estimates in Simple Random Sampling and Some Examples of the Application of Sampling in Insurance Work. R. Ridderstrom (Sweden).

A Mathematical Model for the Time Variation of a Population and the Statistical Evaluation of the Parameter Involved. L. Schmetterer (Germany).

In regard to the sixth topic, papers are presented making detailed analysis of mortality trends in the following countries: Canada, Colombia, Finland, Germany, Great Britain, Japan, Norway, Poland, Sweden, Switzerland, and Venezuela. Several papers also discussed comparative mortality in various countries, while others related to general mortality theory.——*Dr. Robert J. Myers, Social Security Administration*

Italy

The ITALIAN SOCIETY OF ECONOMICS, DEMOGRAPHY, AND STATISTICS has announced its new officers and Council. The President is Professor Lanfranco Maroi (Naples), president of the Central Institute of Statistics. Vice-Presidents are Professors Marcello Boldrini and Giorgio Mortara of the University of Rome.

Members of the Council are Professors Mario Alberto Coppini (Rome), Paolo Fortunati (Bologna), Giovanni Schepis (Rome), Mario Tofani (Florence), Albino Uggè (Padua), and Silvio Vianelli (Palermo). The outgoing President, Professor Gustavo Del Vecchio (Rome), will continue to be a member of the Council. The Secretary General is Professor Stefano Somogyi (Florence).——*Italian Society of Economics, Demography, and Statistics.*

Japan

The INSTITUTE OF ASIAN ECONOMIC AFFAIRS, established in November 1958, was reorganized into a special corporation of semi-governmental character, by an Act of the Diet in 1960. The purposes of the Institute are to conduct basic studies, collect library materials, and disseminate results concerning the economy and related aspects of Asian and other countries and thus to contribute to economic development of Asian countries.

Among the current research activities are several Working Groups on Statistics. A volume on foreign trade statistics in Asia is scheduled for publication soon.——*The Institute of Asian Economic Affairs, Tokyo*

Union of South Africa

The SOUTH AFRICAN STATISTICAL ASSOCIATION held a short Conference at Pretoria, October 28, 1960. About 70 people attended the Conference. The Chairman was Professor H. S. Steyn of the University of South Africa, who was President of the Association for the year 1950-60. Eight papers, mainly on the theoretical side, were read and discussed. ——*Professor J. E. Kerrich, University of the Witwatersrand, Johannesburg*

U S S R

The MOSCOW MATHEMATICAL SOCIETY announces the organization of a section on the theory of probability and mathematical statistics. Persons doing scientific work in the fields of probability theory and mathematical statistics and their applications will be eligible for membership. ——— *Teoriia Veroiatnostei i ee Primeneniia, Moscow*

FEDERAL STATISTICAL ACTIVITIES

Government Statistical Programs Recommended in the 1962 Federal Budget

The 1962 Federal Budget submitted to the Congress in early January calls for an increase for current statistical programs to $47,100,000 from an estimated level of $43,600,000 for 1961. This sum is exclusive of major census projects and the program for revising the CPI, which are listed as "periodic programs" in the "Special Analysis of Principal Federal Statistical Programs in the 1962 Budget." The amounts requested, by agency, are summarized in the table.

The 1962 recommendations continue the efforts of recent years to achieve a better balanced, more adequate statistical program for the government as a whole. All requests for 1962 are of course, subject to Congressional approval or modification. The actions of the new administration may also call for changes in these programs. Changes will be reported in future issues of THE AMERICAN STATISTICIAN.

Highlights of the recommended budget, by broad subject area, are:

Labor statistics.—The recommended, increase over 1961 of approximately $800 thousand, represents increases ($600 thousand) in the statistics compiled by the Bureau of Labor Statistics, plus funds ($200 thousand) transferred from the budget of the National Science Foundation for surveys of scientific manpower.

Four increases over present programs are recommended for the Bureau of Labor Statistics: (1) about $300 thousand for studies on the characteristics of the unemployed; (2) an increase of $134 thousand for analyses of collective bargaining agreements—the first expansion in these statistics in over a decade; (3) an increase of $100 thousand to provide estimates for employment and unemployment created by exports and imports; and (4) about $75 thousand to extend the labor turnover statistics program.

Other programs in this subject area, for which no increases are requested in 1962, are the statistics

compiled by the Bureau of Labor Statistics on wages, hours, measurement of productivity, industrial hazards, and foreign labor conditions, and the statistical work on farm labor by the Agricultural Marketing Service.

Demographic and social statistics.—The principal programs in this area are located in the Department of Health, Education, and Welfare. They include the research and statistical activities of the Office of Education; the compilation of the national statistics of births, deaths, marriages, and divorces by the National Office of Vital Statistics; and the national health survey conducted by the Public Health Service. In August 1960 the National Center for Health Statistics which includes the U. S. National Health Survey and the National Office of Vital Statistics, was established.

The current population studies of the Bureau of the Census and the studies of the farm population by the Agricultural Marketing Service are also included in this area.

An increase over 1961 of $1 million is recommended. About $600 thousand will permit the National Center for Health Statistics: (1) to continue the vital statistics program on the census-related studies initiated in 1961, including more geographic area tabulations, preparation of official U. S. decennial life tables, analysis of a special sample of 1960 marriage and divorce transcripts, and compilation and publication of vital statistics rates 1900-1960; (2) to make special studies of medical care for the aged, and (3) to begin the survey of medical records, which is the third phase of the national health survey. In addition, $400 thousand is recommended for reducing the backlog of machine tabulating work, expanding the professional staff of the Educational Statistics Branch of the Office of Education, and for studies of classroom shortages and higher education.

Prices and price indexes.—The programs in this area will continue at the same level in 1962 as in 1961. These include the current programs of the Bureau of Labor Statistics dealing with wholesale and consumer prices and price indexes; and of the Agricultural Marketing Service on prices received and paid by farmers and on factors affecting prices, supply and consumption of agricultural products.

Production and distribution statistics.—Statistics on production and distribution comprise the current business, industrial, agricultural, and foreign trade statistics compiled by the Bureau of the Census; the work of the Agricultural Marketing Service on crop and livestock estimates; and the Agricultural Research Service program for farm economics research. Increases of about $1.6 million are recommended for 1962.

Nearly $390 thousand is proposed for work by the Bureau of the Census on three retail trade projects and an additional $127 thousand is included for monthly national data on total service trade receipts.

About $80 thousand is proposed for improvements in the monthly survey of manufacturers' sales, orders, and inventories and for work in determining whether or not it is feasible to make a weekly survey of manufacturers' new orders and sales.

About $140 thousand is recommended for the Bureau of the Census to survey the buying plans of consumers. The amount recommended will provide for a quarterly survey of consumers' plans to purchase cars, houses, and selected durable goods in the months ahead.

About $85 thousand is recommended to reinstitute the compilation of air cargo "shipping" statistics.

A further increase of $96 thousand is recommended to initiate additional current commodity surveys to provide data on production of electronics and electrical equipment, rubber products, drugs and medicines, and selected kinds of machinery. For selected products, data on stocks, receipts, and consumption will also be obtained.

A recommended increase of $500 thousand for the Agricultural Marketing Service will permit the expansion of enumerative surveys to obtain crop acreage and livestock numbers and of objective yield measurements for corn, wheat, and soybeans in certain States.

About $225 thousand is recommended for the farm economics research section in the Agricultural Research Service for expanded research, primarily in the economics of farm size.

Construction and housing statistics.—This program has been maintained at around a $1 million level since 1960. Monthly reports are published on housing starts, number of dwelling units and value of residential construction authorized by building permits, and construction costs, as well as quarterly data on housing vacancies and expenditures for residential alterations and repairs. An increase of nearly $200 thousand is proposed for 1962 to develop a series on expenditures for repairs, maintenance, and alterations of nonresidential properties, similar to the series on residential property, and for developmental work on construction price indexes.

National income and business financial accounts—The statistical programs included here are concerned primarily with the analysis of the national economy. The area includes all the work of the Office of Business Economics; the work of the Internal Revenue Service in compiling statistics from personal and corporate income tax returns; estimates of farm income by the Agricultural Marketing Service; statistics on the financial and other operations of State and local governments compiled by the Bureau of the Census; the quarterly financial reports programs, presenting income and balance sheets data for manufacturing corporations, conducted jointly by the Federal Trade Commission and the Securities and Exchange Commission, and other economic statistical series compiled by the Securities and Exchange Commission.

Approximately $100 thousand is recommended for the Office of Business Economics to expand its study of inter-industry purchases and sales and to provide estimates of real income, by industry.

The amounts for the statistical reporting functions of the Internal Revenue Service are not directly comparable for the 3 years shown because of a realinement of functions. Within the amount recommended for 1962, it will be possible to continue the basic statistics of income tabulations, to tabulate data for the 100 largest standard metropolitan statistical areas from individual tax returns, and to continue efforts to compile data on the age and structure of depreciable assets of corporations.

Periodic Programs

The periodic programs include the major censuses, scheduled by law to be made by the Bureau of the Census at 5- or 10-year intervals, and the major program for the Bureau of Labor Statistics to revise the Consumer Price Index, started in 1960 and to extend over a 5-year period. These periodic programs are considered separately from the current programs described above because the wide annual fluctuations in their costs prevent meaningful comparisons from year to year of total outlays for statistical programs.

Periodic censuses.—The appropriation request for 1962 for the Eighteenth Decennial Census is $3.6 million which will be used for final tabulations and publication of the data collected in the 1960 censuses of population and housing.

Planning for the 1962 Census of Governments is under way with funds appropriated for 1961. The $1.1 million recommended for 1962 will be used for work on collecting and processing most of the data to identify local governmental units and the data on public employment and tax valuation, and for completing preparations for the governmental finances survey.

Censuses of business, transportation, manufactures, and mineral industries are next scheduled to be taken covering calendar year 1963. The 1962 budget recommends $1 million for these censuses for preparatory work. Experience has demonstrated that more adequate preparation involving longer leadtimes is necessary if the full potentialities of electronic data processing equipment are to be realized. Present plans also call for the collection, on a sample basis, of certain types of information in the years immediately preceding or following the scheduled census year.

Revision of the Consumer Price Index.—An amount of $2.1 million is recommended for work in 1962 on the revision of the Consumer Price Index. In 1961, $1.3 million was appropriated for dwelling unit surveys, for beginning surveys of family income and expenditures, and for initiating the pricing of additional items to be included in the Index. The amount requested for 1962 will provide for completing the surveys of family income and expenditures, including a sample of rural nonfarm and farm families. The pricing work necessary for improving the sample of prices of the Index will be continued in 1962.——*Raymond T. Bowman, Office of Statistical Standards, Bureau of the Budget*

FUNDS FOR PRINCIPAL STATISTICAL PROGRAMS, BY AGENCY

[In millions of dollars]

Agency	1960 actual	1961 estimate	1962 budget request
CURRENT PROGRAMS			
Department of Agriculture:			
Agricultural Marketing Service:			
Economic and statistical analysis	1.6	1.8	1.8
Crop and livestock estimates	6.4	7.9	8.5
Agricultural Research Service: Farm economics research	2.9	3.2	3.4
Department of Commerce:			
Bureau of the Census	8.6	9.6	10.7
Office of Business Economics	1.4	1.5	1.6
Department of Health, Education, and Welfare:			
Office of Education: Research and statistics	.8	.9	1.3
Public Health Service: National health statistics	3.0	4.0	4.6
Department of Labor: Bureau of Labor Statistics	10.5	11.1	11.8
Treasury Department: Internal Revenue Service: Statistical reporting	2.6	3.0	2.9
Federal Trade Commission: Financial reports	.2	.3	.3
Securities and Exchange Commission: Operational and business statistics	.2	.2	.2
Total, current programs	38.3	43.6	47.1
PERIODIC PROGRAMS			
Department of Commerce: Bureau of the Census:			
1958 economic censuses	5.1	2.2	
Eighteenth Decennial Census	90.1	22.4	5.1
1962 Census of Governments		.1	1.1
1963 economic censuses			1.0
Department of Labor: Bureau of Labor Statistics: Revision of Consumer Price Index	.2	1.3	2.1
Total, periodic programs	95.4	26.0	9.3
Total, principal statistical programs	133.7	69.6	56.4

Note.—Detail will not necessarily add to totals because of rounding.

Statistics for the 60's—FSUC Report

The Federal Statistics Users' Conference has released a report calling for the long range development of Federal statistics programs better suited to modern needs for information. The report was submitted to Maurice H. Stans, the outgoing Director of the Bureau of the Budget, to his successor, David E. Bell, and to Senator Paul H. Douglas, Chairman of the Joint Economic Committee.

The Conference is an organization whose members are business, farm, labor, and nonprofit research organizations which use Federal statistics and are interested in their improvement. Robert J. Eggert, Marketing Research Manager, Ford Division, Ford Motor Company, is Chairman of the Conference. Gerhard Colm, Chief Economist, National Planning Association, headed the Committee which prepared the report.

"A Long Range Program for the Improvement of Federal Statistics" is the result of a year's intensive study of the information needs of nongovernmental users of Federal data from all sectors of the economy.

It is the outgrowth of a long-felt need for a general framework which would enable users to better evaluate the effectiveness of existing statistical programs and the relative importance of specific proposals to improve them. In part, it is a response to persistent urging from members of the Joint Economic Committee who have repeatedly asked users to undertake such an evaluation.

In his letters to Mr. Stans, Mr. Bell,

and Senator Douglas, Mr. Eggert said:

"If Federal statistics programs are to meet the test of optimum usefulness at minimum cost, there must be an adequate set of criteria against which competing needs can be measured. In addition, there must be a pattern of consistency and persistence in the planning and development of statistical programs."

As criteria for evaluating statistical programs, the report suggests:

1. Statistical programs which serve multiple and widely felt needs should have priority over those which serve limited purposes.
2. Every statistical program should be considered in terms of possible uses to which the information can be put and should be designed to provide optimum usefulness for these different purposes.
3. New programs, or existing programs, which have been substantially expanded should not be further expanded until the information made from the previously expanded program has met the test of usefulness.
4. Competing demands for limited resources require both users and producers of statistical data to make a continuing evaluation of the relative usefulness of existing and proposed programs. New programs should not be initiated at the expense of essential existing programs. At the same time, alleged needs of existing programs should not be used as a means of discouraging the development of new and promising ideas.
5. Existing data sources should be used as fully as possible as an alternative to starting a new statistical program.

The report notes needs for improvement in every major area of the Federal statistics program. (A list of some major needs for improvement is attached.)

References to the need for better timeliness and more adequate geographic detail are scattered throughout the report.

The report urges wider application of the techniques used in producing advance reports to increase timeliness. As regards geographic detail, it notes that there can be no indiscriminate expansion in this direction but points out that many problems of national significance require information in some geographic detail if they are to be dealt with effectively.

The report notes that the rapid development of data processing techniques and new accounting and statistical concepts and practices will pose new problems and will offer new opportunities for providing more useful data from Federal statistics programs. The Federal Statistics Users' Conference is establishing a committee to work with other interested groups to explore ways of using new developments to the best advantage in Federal statistics programs.

Mr. Eggert's letters of transmittal note that the Conference intends to review the report and its recommendations continuously and to revise it periodically as needs for information develop or change. He called the report "a considered expression of the common needs for information from Federal statistical sources made by a broadly based group of users who have carefully examined existing programs and over 250 specific proposals for their improvement."

Some Major Needs for Improvement

1. Better data on population and household changes in non-Census years, including qualitative improvements in current population estimates and improved projections of population for the nation as a whole, for States, and for metropolitan areas. A second sample for the *Current Population Survey* is a first priority prerequisite for many improvements in this area.
2. Adequate data on manpower, wages, productivity, and labor uses to meet the needs of the sixties. An expanded *Current Population Survey* could be used to develop additional current information on young workers, older workers, and occupational mobility in the *Monthly Report on the Labor Force.* It would provide a starting place for developing current estimates and projections of the labor force by States and for metropolitan areas.
3. Greater efforts to improve the usefulness of statistical materials gathered by U. S. representatives abroad. An adequate indexing of available data would be an important first step in this direction.
4. The development of foreign trade statistics in terms of the Standard Industrial Classification used for statistics relating to the domestic economy. This would increase understanding of the impact of foreign trade on the economy.
5. The continuation of efforts to meet first priority needs for better construction statistics. These include: a regular survey of the characteristics of new housing; a regular survey of expenditures for maintenance and repairs, additions and alterations; the elimination, so far as possible, of inconsistencies between current housing starts data and the Census of Housing or the National Housing Inventory; the continuation of the National Housing Inventory as a regular feature of the Federal statistics program; and the development of an adequate cost of construction index.
6. Modernization of agricultural data both as regards statistical techniques employed and as regards the kinds of data produced. Greater efforts should be directed towards developing current information by economic class of farm and by kinds of commercial farms.
7. More timely processing and release of the *Annual Survey of Manufactures.* If additional commodity surveys are added to the *Current Industrial Reports* series, priority should be given to surveys relating to products of growing importance.
8. The inclusion of merchandise line statistics in the next *Census of Business,* and continued efforts to improve current data on retail and wholesale trade.
9. A *Census of Transportation* is a first step in developing more useful data on transportation as an economic activity.
10. Better business profits information and more frequent reporting of State and local government expenditures to significantly strengthen the national economic accounts.

11. Anticipatory data on government expenditures, Federal, State, and local to provide an additional indicator of great importance for short-term forecasting.
12. Adequate financial support for the interindustry purchases and sales studies of the Office of Business Economics in order that this important program might make its proper contribution to increasing existing knowledge about the economy.

NSF Studies of R & D

The President's Executive Order 10521 of March 1954 directs the National Science Foundation "to make comprehensive studies and recommendations regarding the Nation's scientific research and its resources for scientific activities."

A series of surveys begun in 1954 represented the first comprehensive examination of the Nation's research and development effort in terms of both dollars and manpower. The findings, published by the Foundation in seven complete reports, form the basis for a statistical time series and provide benchmark information on the national R&D effort.[1] For the first time, these surveys gave a systematic picture of how much research and development was being done in each of the various fields of science and in each sector of the economy, how much the Nation was spending on research and development, who was footing the bill, who was performing the work, and how many persons were engaged in research and development in each of the sectors and in each scientific field.

For survey purposes, the economy is divided into four sectors—the Federal Government, industry, colleges and universities, and other nonprofit institutions. Within each of these four sectors fall the Federal contract research centers, relatively large-scale R&D undertakings administered for the U. S. Government by industrial organizations, colleges and universities, and other nonprofit institutions.

[1] National Science Foundation. *Methodology of Statistics on Research and Development*, Washington 25, D. C.: Supt. of Documents, U. S. Government Printing Office, ($1.25) p. 67.

The colleges and universities and other nonprofit organizations, such as independent research institutes and philanthropic foundations, may sometimes be treated as one consolidated nonprofit sector in other discussions of R&D financing, but the Foundation's special interest in the activities and support of institutions of higher education leads it to identify colleges and universities as a separate sector. This sector includes not only private institutions but also schools which are supported by State and local units of government.

Information provided in the initial statistical series shows that there has been a rise in current dollars expended for scientific research and development for each year since the first study. For the year 1960-1961, the total is estimated at $13.5 billion, more than double the $5.2 billion estimated for 1953-1954. The sectors, in their roles as performers of research and development, show that industrial organizations experienced the greatest percentage increase in expenditures over this period—180 percent; Federal agencies showed the smallest—96 percent. For broad comparative purposes, it is interesting to note that national economic activity as a whole, as measured by the gross national product, increased by some 38 percent during the same period.

To depict the financial interrelationships which underlie the performance of research and development, the Foundation employs an R&D matrix or transfer table. The basis for the table is the well-known fact that, in the R&D economy, activity is sustained by a continuous inter- and intra-sectoral flow of funds from sectors acting as sources of funds to the same or other sectors acting as users of funds, that is, as performers of research and development. The Foundation's R&D surveys obtain information on both these complementary roles for all respondents, but the transfer tables are based primarily on reports by performers of how much they spent during a given 12-month reporting period and on the sources of the funds so spent. This procedure minimizes double-counting and maximizes correct identification of those who actually do the research and development. The most recent transfer tables soon to be published by the Foundation cover the years 1957-58, 1958-59, and 1959-60.

The statistics do not indicate the direction in which policy should go but they do reflect, in quantitative terms, some of the intersectoral relationships about which a great deal of public discussion and inquiry have taken place. For instance, the fact that the single largest transfer of R&D dollars is from the Federal Government to industry focuses on the problem of the impact of Federal spending in this area.

This background of comprehensive data, essential to the development of science policy, has been utilized in the Foundation's policy studies. Such information has served further in the development of national science policy as well as policy relating to the operation of programs of the Foundation and of other Federal agencies. An example concerning both of the latter types of policy development relates to the payment of indirect costs of federally sponsored research. Information developed in the 1958 survey of universities and colleges has had a strong impact on Federal policy relating to indirect costs as well as on individual agency policy.

Extending the knowledge furnished by the fact-finding operations, the Foundation has undertaken a number of special analytical studies. These are intended to provide better understanding of the nature and significance of the survey data. Specific examples of such projects are (1) a study of the relation of research and development to the growth of a company; (2) exploration of the factors determining the level of research and development within a firm; (3) cost index of research and development; and (4) relation of data on R&D activities to the gross national product.

Reports on R & D Statistics

(The reports listed below and issues of the bulletin, *Reviews of Data on Research & Development*, Nos. 16-25 can be obtained from the Supt. of Documents, U. S. Government Printing Office, Washington 25, D. C.)

FUNDS FOR RESEARCH AND DEVELOPMENT IN INDUSTRY, 1957 (65 cents)

SCIENCE AND ENGINEERING IN AMERICAN INDUSTRY. A REPORT ON A 1956 SURVEY (70 cents)

FEDERAL FUNDS FOR SCIENCE IX. THE FEDERAL RESEARCH AND DEVELOPMENT BUDGET, FISCAL YEARS 1959, 1960 and 1961. (50 cents)

REVIEWS OF DATA ON RESEARCH & DEVELOPMENT

25. "Funds for Research and Development in Agricultural Experiment Stations and Colleges of Agriculture in the U. S., Fiscal Year 1958." (10 cents)
24. "Funds for the Performance of Research and Development in American Industry, 1959." (10 cents)
23. "Federal Contract Research Centers in Colleges and Universities, Fiscal Year 1958." (5 cents)
22. "Funds for the Performance of Basic Research in the United States, 1953-58." (15 cents)
21. "Funds for Research and Development in Engineering Schools, Fiscal Year 1958." (10 cents)
20. "Funds for Research and Development Performance in American Industry, 1958." (10 cents)
19. "Funds for Research and Development in Colleges and Universities, Fiscal Year 1958." (10 cents)
18. "Research and Development Expenditures of Selected Groups of Nonprofit Institutions, 1957." (5 cents)
17. "Funds for Research in Medical Schools, 1957-58." (10 cents)
16. "Funds for Research and Development in the United States, 1953-59." (10 cents)

*15. "Research and Development Expenditures of Foundations and Health Agencies, 1957."

—*Jacob Perlman, Office of Special Studies, National Science Foundation.*

* Copies can be obtained from the National Science Foundation, Washington 25, D. C.

Price Statistics Report

The Subcommittee on Economic Statistics of the Joint Economic Committee, Congressman Richard Bolling, Chairman, is holding hearings on the report submitted to the Bureau of the Budget by the Price Statistics Review Committee of the National Bureau of Economic Research. The report, entitled "The Price Statistics of the Federal Government: Review, Appraisal and Recommendations," was prepared by the Review Committee consisting of: George J. Stigler, University of Chicago, Chairman, Edward F. Denison, Committee for Economic Development, Irving Kravis, University of Pennsylvania, Albert Rees, University of Chicago, Richard Ruggles, Yale University, Boris Swerling, Stanford University, Dorothy Brady, University of Pennsylvania, Philip J. McCarthy, Cornell University.

The first hearing was held January 24 with Senator Sparkman presiding. Raymond T. Bowman, Assistant Director for Statistical Standards, Bureau of the Budget, transmitted a copy of the report to the Subcommittee. He explained briefly the background of the Review Committee and gave a brief summary of its findings and recommendations.

The Subcommittee has announced that additional hearings will be held later in the spring. At these hearings members of the Review Committee, representatives of the agencies preparing price statistics in the Federal Government, and an invited group of users and students of such statistics will be invited to testify. The report of the Review Committee, together with 12 Staff Papers which were transmitted with it, will be printed as part of the proceedings of the Subcommittee. The authors and titles of the staff papers are: Philip J. McCarthy—Sampling Considerations in the Construction of Price Indexes with Particular Reference to the United States Consumer Price Index; Victor Zarnowitz—Index Numbers and the Seasonality of Quantities and Prices; Harry E. McAllister — Statistical Factors Affecting the Stability of the Wholesale and Consumers' Price Indexes; Eleanor M. Snyder—Cost of Living Indexes for Special Classes of Consumers; John Flueck—A Study in Validity: BLS Wholesale Price Quotations; Peter O. Steiner—Consumer Durables in an Index of Consumer Prices; Albert Rees—Alternative Retail Price Indexes for Selected Nondurable Goods, 1947-59; Zvi Griliches — Hedonic Price Indexes for Automobiles; An Econometric Analysis of Quality Change; Walter Y. Oi, David E. Lund, and Paul P. Bestock—An Index of Motor Freight Rates; Geoffrey Shepherd—Appraisal of Alternative Concepts and Measures of Agricultural Parity Prices and Incomes; Earl R. Swanson—Unit-Value Pricing of Prices Received by Farmers; Reuben A. Kessel—The Measurement and Economic Implications of the Inclusion of Indirect Taxes in the Consumers Price Index.——*James W. Knowles, Economist, Subcommittee on Economic Statistics, Joint Economic Committee.*

SEC Revises Indexes Of Weekly Stock Prices

The Securities and Exchange Commission recently revised its indexes of weekly closing prices of common stocks on the New York Stock Exchange. Two major revisions have been made: (1) the base period has been changed to the years 1957-1959 from the former base year of 1939, and (2) the coverage has been expanded to include 32 industry classifications and 300 stocks, in place of 29 groups covering 265 issues.

Stocks in the SEC index are grouped according to the 1957 Standard Industrial Classification issued by the Bureau of the Budget. The stock price index is published each Monday in connection with the regular weekly report on trading by members of the New York and American Stock Exchanges. It also appears in the Commission's monthly "Statistical Bulletin," in the monthly "Federal Reserve Bulletin," and in "Economic Indicators" issued by the Joint Economic Committee of Congress.

Among other changes, five new industry groups have been added to the revised stock price index: Office Machines, Scientific Instruments, Other Chemicals (other than industrial chemicals and drugs), Rubber Products, and Other Finance & Service (other than investment companies and motion pictures). The Railroad Equipment and Household Machinery indexes have been discontinued.

A pamphlet containing the list of stocks included in the index, a description of the method of computation, and weekly and monthly indexes on the revised basis from 1939 to date is available. Request copies from SEC, Washington 25, D. C.——*Helen K. Steiner, Division of Trading and Exchanges, SEC.*

Among Recent Federal Publications

Board of Governors of the Federal Reserve System

The results of the first seven surveys in the Federal Reserve Board's project to develop quarterly information on consumers' buying intentions were presented in two articles in the September 1960 "Federal Reserve Bulletin." These surveys have been conducted for the Board by the Bureau of the Census once each quarter starting in January 1959. In addition to an analysis and evaluation of the results of the first seven surveys, the September articles present a detailed description of the survey and information on fulfillment rates of individual respondents based on reinterview studies. Reprints may be obtained from the Division of Administrative Services, Board of Governors of the Federal Reserve System, Washington 25, D. C.

Bureau of Labor Statistics

"Subject Index of Bulletins Published by the Bureau of Labor Statistics, 1915-59, with Annotated Listing of Bulletins, 1895-1959" may be purchased for 55¢ a copy from the Superintendent of Documents, Government Printing Office, Washington 25. D. C.

The first annual (1959) "Statistical Supplement to the Monthly Labor Review" may be obtained from the Superintendent of Documents for 60¢. This publication is included in the annual subscription price of the "Monthly Labor Review."

A detailed report on the purposes and methods of the interim revision of the City Workers Family Budget was published in the August 1960 Monthly Labor Review. Copies of this study may be obtained from the Division of Prices and Cost of Living, Bureau of Labor Statistics, Department of Labor, Washington 25, D. C.

Bulletin 1277, "School and Early Employment Experience of Youth" is available for 50¢ from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. This 89-page report gives detailed findings of surveys of school leavers in seven communities.

Office of Business Economics

"U. S. Business Investments in Foreign Countries" may be purchased for $1.00 a copy from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

"Income in Alaska," a supplement to the Survey of Current Business showing annual estimates of personal income in Alaska from 1950 forward, is available (35¢) from the Superintendent of Documents.

1960 Follow-up Sample Survey of Agriculture

Plans for the 1959 Census of Agriculture included a follow-up sample survey to be done in the fall of 1960. This would permit inclusion in the total program of a number of items which could not be included in the regular census schedule. Moreover, these could be collected on the basis of a sample far smaller than the 20 percent sample which was used as part of the census operation. In order to provide maximum comparability, the small sample survey was planned for the fall of 1960. Work is about completed on the enumeration for this portion of the program.

This survey covers approximately 10,000 farms in 2,700 segments and, in addition, approximately 4,000 large farms. This sample survey will obtain information on the amount of income received by farm operators and members of their families from 11 nonfarm sources; the extent of use of special farm machines such as grain combines, corn pickers, cotton pickers, etc.; the number and size of new buildings built on farms since January 1, 1958 and materials used for exterior walls, roof coverings, and framing; the extent and characteristics of contract farming; and the amount of money owed by farmers not only as mortgage debt but for production supplies. The sample survey will also obtain information on acreage and production of crops, number of livestock, and on sales of livestock and livestock products in order to provide a basis for the classification of farms included in the survey by type of farm and by economic class of farm. The sample has been designed to provide estimates for the United States and, for some items, for three geographic regions. It is expected that the results of this sample survey will be published in preliminary form during the first half of the calendar year 1961.

——Ray Hurley, Chief, Agriculture Division, Bureau of Census.

Canadian Statistical Projects

The Dominion Bureau of Statistics, the central statistical agency of the Government of Canada, has under way or is planning several projects to improve the Canadian statistical system. Trade statistics are being revised to conform to the Standard Commodity Classification. The present classification of imports is about 40 years old and is obsolete in many fields. When the revision is completed import and export data will be classified on the same basis as domestic production.

With the completion of the large scale revision of the annual National Accounts for Canada, attention has been directed to the quarterly estimates. Particular attention is being given currently to the quarterly measurement of farm production, capital formation and constant dollar series. An effort is being made to obtain current balance sheet data for non-financial corporations, which has constituted a gap in the system of financial statistics.

Expansion of energy statistics—production and distribution of solid fuels, petroleum, gas and electricity is under way. This has been necessitated by increasing needs of industry, together with the new administrative and research needs of the Energy Board.

In June 1961, the decennial census of population, housing and agriculture, plans for which were described in the February 1960 issue of THE AMERICAN STATISTICIAN, will be taken. The Dominion Bureau of Statistics is obtaining its own IBM 705 computer, which will be used in processing census data. This computer will also enable the Bureau to extend somewhat its seasonal adjustment of important statistical series.

WALTER F. WILLCOX: STATIST*

WILLIAM R. LEONARD, *Director, Statistical Office, United Nations*

In the opening words of his preface to *Studies in American Demography*, published in 1940, Professor Willcox says: "During the last half century demography, or the statistical study of population, has grown from infancy into lusty youth." During the same half century Professor Willcox published what he calls "fragments" which he had once hoped "with ardor born of youth and inexperience" would be an Introduction to American Demography but he found himself handicapped by the then inadequacies of American birth and death statistics. Nevertheless, he pursued his goal with vigor and effectiveness with the result that up to 1940 he had published more than 100 of what he terms his "more important writings." These appeared in official government publications, in professional journals, in encyclopaedias, as monographs and in books which he edited or to which he contributed. He managed to deal with almost the entire gamut of demographic statistics. His subjects ranged from estimating total world population (from 1650) to studies of marriage and divorce, birth and death rates, migration and health statistics and registration and census methods.

All these investigations were extremely valuable in themselves, illuminating usually for the first time, many diverse problems of American society. But perhaps more important, they represented the application of statistical methods to sociology and thus paved the way for later scholars, with vastly improved basic data, to probe deeper into social problems and their interrelationships. In the "Introductory Definitions" to his *Studies in American Demography*, Professor Willcox summarizes his position by saying: "I have long agreed with recent statements that 'except for statistics . . . no new technique for studying social problems has been developed in modern times' [T. N. Carver] and that 'it is principally by the aid of such methods that these studies may be raised to the rank of sciences' [R. A. Fisher]. These convictions lie at the root of my predominant interest in statistical sociology." Professor Willcox' studies represented pioneer work in the subjects selected and in the analytical methods used.

Walter Francis Willcox was born on March 22, 1861 in Reading, Massachusetts. He graduated with an A.B. degree from Amherst College in 1884. He received an A.M. degree from Amherst in 1888, an LL.B. degree in 1887 and a Ph.D. degree in 1891, both from Columbia, and an honorary LL.D. degree from Amherst in 1906.

EDITOR'S NOTE

Dr. Leonard, President of ASA in 1957, was one of the last graduate students of Professor Willcox at Cornell University and was his statistical assistant for a number of investigations in which Professor Willcox was engaged. Their association continues through common interests in the International Statistical Institute.

During the academic year 1889-90 he studied in Germany, at the University of Berlin, one of a group of American scholars who in later years became distinguished in their several fields.

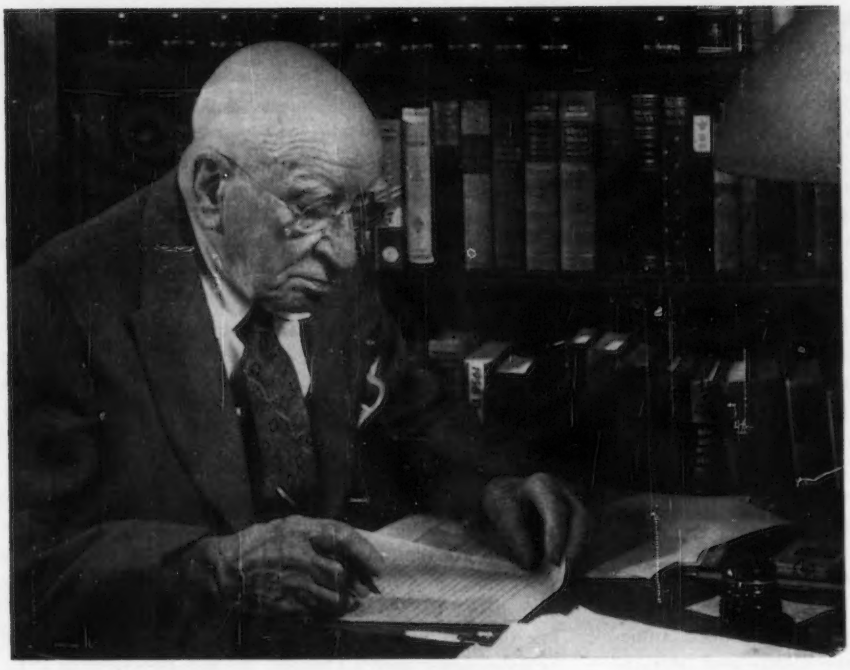
He joined the faculty of Cornell University in 1891, serving as an instructor and associate professor until 1901, when he became professor of economics and statistics, a chair he held with high distinction until his retirement, as professor emeritus, in 1931. In addition to his strictly scholarly pursuits he was dean of the College of Arts and Sciences from 1902 to 1907 and faculty representative on the Board of Trustees from 1916 to 1920.

Professor Willcox was responsible for initiating one of the earliest university courses in statistics in the United States. Prior to the 1890's, only some seven institutions offered courses, described as including statistics. During the 1890's sixteen universities began to offer such courses, among them Cornell in 1892-93 with "an elementary course in statistical methods with special treatment of vital and moral statistics" taught by Professor Willcox. This and its successor, sometimes called *Social Statistics*, was offered for many years with the exception of those periods when Professor Willcox was at the Bureau of the Census in Washington. It has been said that Professor Willcox and Professor Davis R. Dewey of the Massachusetts Institute of Technology enjoyed the distinction of having taught statistics longer than any other persons in the United States.

During his 40-year tenure at Cornell, Professor Willcox engaged in many "extra-curricular" activities. From 1899 to 1901, he was one of five professional statisticians in charge of the 12th (1900) census of the United States, serving as chief of the division of methods and results, a division charged with the analysis and interpretation of the census results. During part of this period, he served on the New York State Board of Health, an experience which he described as "brief and unproductive" because of the fact that the civil registration system of New York State required to be improved before useful interpretations of the statistics could be made.

Professor Willcox's participation in the census of 1900

* Professor Willcox, especially in his researches into the history of statistics and statisticians, prefers the older, shorter term *statist* to the "modern tongue-twisting" term *statistician*, thus reviving the precedent set by William Farr and Ralph Waldo Emerson. The reasons for his preference are contained in "Definitions of Statistics and of Demography," a paper prepared by him for the *Revue* of the International Statistical Institute in 1935.



Dr. Walter F. Willcox, born March 22, 1861 and president of the American Statistical Association in 1912. This picture was taken recently in his study in Ithaca, N.Y. He plans to attend the statistical sessions in his honor at Cornell April 20, 21, 22. (See the news note on page 3 of this issue for details of this meeting.)

arose from the work of a Committee appointed by the American Economic Association in 1897 to review the 11th (1890) census and to consider "the scope and method of the 12th census". The Committee was well chosen; in addition to Professor Willcox, it included Richmond Mayo-Smith, Carroll D. Wright, Roland P. Falkner and Davis R. Dewey, all well known in the annals of American statistics. The Committee invited contributions on various aspects of the 11th census from some 20 well-known economists and statisticians. Their contributions were published by the Association in 1899 as *The Federal Census: Critical Essays* and did much to influence the content and analytical possibilities of the 12th census, the more so since five of the contributors to the *Essays* became chief statisticians in connection with that census.

In his capacity as chief statistician for methods and results, Professor Willcox obtained the approval of the Director of the Census, William R. Merriam, to arrange for analyses and interpretations of the census supplementary to the routine reports on population and vital statistics. In order to carry out this task the Bureau of the Census enlisted the help of the presidents of some 20 universities, inviting them to submit the names of outstanding graduate students who might be willing to assist in the analysis. This approach worked well; a large number of scholars responded and with Professor Willcox' participation and supervision, the Bureau was able to publish in 1906 a monumental work entitled *Supplementary Analysis and Derivative Tables*, a volume of more than 1,100 census-size pages. Thus many subjects of demographic importance were adequately interpreted for the first time.

Professor Willcox' interest in vital statistics never flagged. Years later, when civil registration had improved considerably, he was invited by the Bureau of the Census to prepare a detailed analysis of vital statistics. This appeared as the *Introduction to the Vital Statistics of the United States, 1900 to 1930.**

About this time also, Professor Willcox was invited by the National Bureau of Economic Research to direct an inquiry, recommended by a Committee of the Social Science Research Council, into the scientific aspects of human migrations. Professor Willcox acted as advisor and editor for the first volume entitled *International Migrations: Statistics* which was published by the National Bureau in 1929. It was compiled by Dr. Imre Ferenczi of the International Labour Office and financed in part by a grant from the National Bureau. The second volume, *International Migrations: Interpretations*, appeared in 1931 edited and partly prepared by Professor Willcox. He had enlisted the collaboration of the International Statistical Institute in "the delicate task" of finding scholars to deal with the individual country chapters. He himself prepared a chapter on world population since 1650 and one on immigration into the United States.

From the time of the census of 1900 to the present, Professor Willcox has been deeply concerned with the problem of the apportionment of seats in the House of

* It may be useful to recall the very slow development of civil registration in the United States, a problem which deeply concerned Professor Willcox during most of his writing career. In 1906 only 10 states had laws concerning death registration; by 1926 this number had increased to 41. Birth registration was even slower to develop; in 1916 only 13 states had acceptable laws and only 35 by 1926. It is easy to understand the frustration which must have attended Professor Willcox' labors, especially when he compared the situation in the United States with that in most Western European countries.

Representatives. He first encountered this problem in his official capacity at the Bureau of the Census, whose task it is to prepare the apportionment tables. As recently as June 1959, he appeared before a subcommittee of the Committee on the Judiciary of the House of Representatives again to urge upon the Congress an apportionment based on the method of major fractions, a method once used by the Congress but subsequently replaced by that of equal proportions. Other methods considered workable include the method of smallest divisors, the method of the harmonic mean and the method of greatest divisors. The fact is, of course, that any method of apportioning 435 seats by applying a divisor uniformly to the population of each state will result in whole numbers and fractions. The problem is how to reach a solution in whole numbers of seats which is both mathematically correct and which most nearly conforms to the Constitutional provision that "representatives shall be apportioned among the several States according to their respective numbers", given that each State is initially allotted one representative regardless of the size of the population.

The intricacies of this problem are indeed somewhat elusive. They led, during the 1920's and later, to a prolonged discussion and public debate—in Congressional Committees and professional journals—between Professor Willcox, who espouses the method of major fractions, and E. V. Huntington (professor of mathematics at Harvard) who supported the method of equal proportions. The test of the latter method was described by Huntington as follows: "A transfer of a seat from one state to another should be made if, and only if, the percentage difference between the congressional districts in the two states would be reduced by the transfer". The test of major fractions provides that no state with a major fraction (one which reaches 0.500) shall go unrewarded and none with a minor fraction shall be rewarded. The computations are carried out by a system of sliding divisors until a point is reached where the terms of the test are met. But as Professor Willcox himself said "The results are simple, but the method itself is somewhat difficult to explain".

As more and more scholars were drawn into the discussion, the proponents of the two methods became known as the "Cornell school" and the "Harvard school". The range of discussion included mathematical aspects, the question of which method favored small states at the expense of large (or *vice versa*), political and constitutional interpretations and which method was the easier for the general public and, it is said, for some members of Congress to understand. Professor Willcox holds tenaciously to his views, and while he did not succeed in persuading the Congress to change the 1960 apportionment law, I am sure he is not prepared to give up.

In recent years, he has attempted to convince the Congress that the House is too large. He has submitted schemes progressively to reduce the membership from 435 to 300 on the ground that the former is "too large and unwieldy". He has also proposed Federal legislation to encourage the states to establish congressional districts among which the distribution of population would be approximately equalized.

Professor Willcox' interests and activities over the years have been eclectic. Few problems of social and human relations have escaped his investigations as can readily be seen from the partial bibliography included in *Studies in American Demography*. He has examined the possibility of constructing statistical tests of economic and social progress and concluded somewhat regretfully—even though some evidence looks toward progress, and some toward retrogression—that "the statistical method is unable to tell whether the population of the United States is nearer to the economic optimum than it was a generation ago". This is a subject with which he has always been deeply concerned. In his broadcast on the "This I Believe" program a few years ago he said: "I believe that human freedom to experiment and initiate is the most potent of all the forces working for the progress of mankind".

It was 69 years ago that Professor Willcox became a member of the American Statistical Association and he has devoted himself to its activities during more than half the Association's lifetime. He was president in 1912 and was elected a Fellow in 1917. The year he became a member of ASA (1892) he also joined the American Economic Association, serving as secretary from 1896 to 1899 and as president in 1915 (his presidential address concerned Congressional apportionment). His scholarship was recognized by election to the executive committee of the American Council of Learned Societies (1925-1928) and as its vice-chairman (1926-1928). He is a member of Phi Beta Kappa and Sigma Xi. He has been a Fellow of the Royal Statistical Society since 1897 and an honorary member since 1918. He is an honorary member of statistical societies in several other foreign countries.

His interest and participation in the international statistical scene began in 1893 when he attended the Chicago session of the International Statistical Institute. He became a member of the Institute in 1899 and is now the oldest member. He attended 16 of the 26 sessions of the Institute which have been held since his election, in so doing probably travelling further than any member of the Institute—from Tokyo to Warsaw to Rio and many points in between.

He served the Institute well. Apart from his deep professional interest in the improvement of demographic statistics, represented by his many contributions to its publications and sessions, he served as vice-president from 1923 to 1947, the second American to hold office in the Bureau of the Institute. In 1947, he became the seventh president of the Institute and on completion of his term was elected honorary president, one of four living members so honored. He rendered particularly valuable services in 1933-34 on the occasion of the revision of the Institute's statutes and again in 1946-47 in connection with the general reorganization of the Institute and its work. The 1947 Washington Session was

an outcome of his success, a decade earlier before World War II, in obtaining enactment by the Congress of a Joint Resolution requesting the President to invite the Institute to meet in the United States.

His interest in international statistics extended to painstaking researches into a number of statistical problems which had engaged men's minds from the 17th century onward. His pervading interest in everything statistical and his mastery of the main continental languages enabled him to range far afield from the problems of American demography and apportionment. Some of his findings are classics of historical research. In his continued efforts to clarify obscure points in the history of statistics, for example, he sifted the evidence as to whether John Graunt (whom Professor Willcox considers the founder of statistics) or Sir William Petty, was the author of a publication generally considered to mark the origin of modern vital statistics—the *Natural and Political Observations Mentioned in a following Index and made upon the Bills of Mortality* (1662). He concluded that the overwhelming weight of argument, based on internal evidence and on expert opinion, rested upon the proposition that Graunt was the main, but not the sole author.

As his 100th birthday approaches, his many friends, former students and colleagues in the United States and abroad will gratefully salute Professor Willcox for his many contributions to statistics and sociology and for his tireless pursuit of courses leading to the betterment of man and society. Those of us fortunate enough to be directly associated with some of his investigations will long have cause to remember with deep appreciation his relentless search for truth wherever it might lie and his broad social and humanitarian philosophy which provides the orientation of his investigation.

* * * * *

The author gratefully acknowledges the assistance given to him by colleagues in the Statistical Office of the United Nations and by friends and associates of Professor Willcox.

THE PRESIDENT'S COLUMN—CONTINUED FROM PAGE 1

Our aim is to present as much useful information as we can within the budgetary limits set for printing the Directory. In addition to the alphabetical listing, there will also be geographical and sectional interest listings.

New Committees

Because of the expanding scope of the use of statistics as a tool in different areas, several new committees were appointed by Morris Hansen in the latter part of 1960. The creation of these new committees emphasizes the need for improved communication between persons working with statistics, and those in subject-matter fields. The establishment of new committees as the application of statistical methods to specific areas grows steadily helps provide more of this interdisciplinary flow and "cross-fertilization." The new committees are:

(a) Committee on Statistics in Accounting, Frederick F. Stephan, Chairman. With the cooperation of several members of the American Institute of Certified Public Accountants, the committee will study improvements in statistical methods in auditing and accounting methods.

(b) Committee on Statistics in Meteorology, Herbert C. S. Thom, Chairman. ASA was originally asked to cooperate with the Agricultural Meteorology Committee of the American Meteorological Society. The Board recommended that our committee should be broadened in view of increasing statistical analyses in this field.

(c) Committee on Electronic Computers and Statistics, Richard Ruggles, Chairman. The importance of computers in statistical research, a field in which statisticians have been leading pioneers, warrants continued investigation for additional adaptations.

(d) Committee on Statistics in Marketing, Solomon Dutka, Chairman. This was suggested by ASA's Committee on Committees, citing the developing interest in the use of statistical methods to the field of marketing.

(e) Committee on Applications to Management Science and Operations Research, Herbert Solomon, Chairman. Statisticians are heavily involved in this field. They have contributed greatly to it and there is an obligation to continue close participation in this rapidly ramifying area.

One hoped-for result of the work of these new committees is the stimulation of sessions presented at the annual (and regional) meetings, based on the problems and developments in these areas. Jointly-sponsored sessions at meetings of other societies devoted to various subject-matter fields would also be desirable. A complete listing of all 1961 committees and representatives to other organizations will appear in the April issue of THE AMERICAN STATISTICIAN.

Two other committees have been appointed recently which deal with internal and procedural aspects of the Association. Mr. Hansen appointed a new Committee to Review Procedures for Selection of Fellows, headed by A. Ross Eckler. From time to time, the system of electing Fellows is re-examined and suggestions are made for changes in the Constitution. The Review Committee (which does not replace the continuing Committee on Fellows) will investigate at length the whole policy and submit suggestions for revised procedures. The study may require several years. (Incidentally, the practice of electing Fellows dates back to 1915. The current number of Fellows as of January, 1961 is 327.)

Mr. Riley, our Secretary-Treasurer, in his letter to the members of December 1, pointed to the need for an increase in dues, as a result of deficits in 1960 and 1961. He has warned for several years that ASA, like the majority of other associations, must finally meet rising costs with a rise in dues. The last increase in dues was made in 1949. I have appointed a special committee, headed by Philip M. Hauser, our President-Elect, to look into the whole matter very carefully. A detailed report, covering past income and expenses and projections for the future, has been prepared by Mr. Riley and his staff for the use of the committee. The report and recommendations are scheduled for submission to the Board in the spring.

I feel highly honored to be working with and for the Association as President this year. Let me emphasize that your comments and suggestions in person, by phone or letter will be most welcome.

Editor's Note: This editorial appeared in the December 23, 1960 issue of *Science* and is reprinted here at the suggestion of Donald C. Riley as an item of general interest to the membership of the American Statistical Association.

The Disparagement of Statistical Evidence

WARREN WEAVER
Alfred P. Sloan Foundation

No one would claim that the theory of probability and that great body of statistical theory and practice which is based upon stochastic concepts are easy subjects, either technically or philosophically. The mathematical requirements are considerable, and the reasoning is often subtle.

But the basic procedures by which one treats the necessarily discordant results of any experiment or set of observations, and by which one calculates the degree of confidence justified by the combined result—these procedures are by now well developed, widely accepted, and competently known by any person with the requisite training.

Since the techniques of statistics are complicated, powerful, and not understood by the general public, there is always the chance of misuse. We remember with a shudder the clumsy enthusiasm with which correlation coefficients were seized upon, years ago, by many who wished to create an illusion of scholarly and scientific competence. And even today almost every big national magazine casts about to find a "statistical index" which "proves" that it has the most to offer to advertisers. It is not surprising that a clever and amusing book has been written under the title *How To Lie with Statistics.*

It must also be agreed that the statistical evidence which results from carefully designed experiments provides a much more solid foundation for inference than does statistical evidence which is, so to speak, merely "gathered."

All this is understandable. But it is shocking to note that various groups, in order to shake public confidence in statements which they find uncomfortable, are taking the position that it is silly to be impressed by evidence that is "only statistical."

For some time the outstanding offenders have been persons associated with the tobacco industry, who have claimed that the evidence for the relation between cigarette smoking and lung cancer is *only statistical,* as though that indicated a fancy and unreal sort of argument, which certainly would not affect down-to-earth persons.

But others are now taking similar attitudes towards statistical procedures. In a current news article I read that "the research directors of the Republican and Democratic campaigns say that . . . we find the statistics and then discount them."

It is, of course, possible that the polls in question were not competently planned, conducted, or interpreted. But it is essentially anti-intellectual to indicate a blanket condemnation of statistical evidence.

Science recognizes the basic and the pervasive role played by probability and statistics. It is through a probabilistic procedure that every individual obtains the set of genes which to so great an extent determines what he is. The processes of communication, we have learned in recent years, are essentially statistical in nature. And on the broadest possible scale, our knowledge of the world about us is, in the present view, strictly and inevitably statistical in character.

For the individual behavior of every elementary particle in our universe is governed by laws which can only be expressed in probability terms. Everyday gross phenomena are normally predictable simply because of the vast numbers of individual events involved, the statistics thus become "regular" and dependable, just as is the experience of an exceedingly large life insurance company.

The automatic discarding of evidence because it is statistical is unscientific and wholly unwarranted. Statistical evidence is, in essentially all nontrivial cases, the only sort of evidence we can possibly have.

NEW FOR 1961

ELEMENTS OF STATISTICAL INFERENCE

by DAVID V. HUNTSBERGER
Iowa State University

Gives students an appreciation for, and an understanding of, statistics as a tool of inductive reasoning. The objective is to delve into modern, inductive methods as soon as possible, keeping classical descriptive statistics to a minimum. Techniques for estimation and hypothesis testing are stressed. The numerous problems and examples are based on real facts, selected from a wide variety of subject areas in order to serve as a text for people in all fields where statistics is applied.

FUNDAMENTAL STATISTICS

FOR BUSINESS AND ECONOMICS
2nd Edition

by JOHN NETER
University of Minnesota
and WILLIAM WASSERMAN
Syracuse University

This careful revision of a highly successful text brings modern statistics up to date. By stressing concepts underlying statistical methods, the authors lead the reader logically toward a fuller comprehension of the use of statistical techniques as tools in decision-making. The revised and expanded material includes the treatment of: probability; frequency distributions; statistical estimation and decision-making; forecasting; seasonal variation; plus completely rewritten and expanded problem material.

FUNDAMENTAL STATISTICS WORKBOOK

by BYRON L. NEWTON
Oregon State College

A practical and timely study guide to be used in conjunction with the text by Neter and Wasserman. It provides the student with a review of the necessary mathematics, summaries to help him organize his work, self-tests, basic class notes and review material, and a wealth of problems.

for further information write to: Arthur B. Conant

ALLYN AND BACON INC.
150 Tremont St., Boston 11, Mass.

BAYESIAN STATISTICS*

F. J. ANSCOMBE, Princeton University and University of Chicago

During the last few years there has been a revival of interest among statistical theorists in a mode of argument going back to the Reverend Thomas Bayes[1] (1702-61), Presbyterian minister at Tunbridge Wells in England, who wrote an "Essay towards solving a problem in the doctrine of chances," which was published in 1763 after his death. Bayes's work was incorporated in a great development of probability theory by Laplace and many others, which had general currency right into the early years of this century. Since then there has been an enormous development of theoretical statistics, by R. A. Fisher, J. Neyman, E. S. Pearson, A. Wald and many others, in which the methods and concepts of inference used by Bayes and Laplace have been rejected.

The orthodox statistician, during the last twenty-five years or so, has sought to handle inference problems (problems of deciding what the figures mean and what ought to be done about them) with the utmost "objectivity." He explains his favorite concepts, "significance level," "confidence coefficient," "unbiased estimates," etc., in terms of what he calls "probability," but his notion of probability bears little resemblance to what the man in the street means (rightly) by probability. He is not concerned with probable truth or plausibility, but he defines probability in terms of frequency of occurrence in repeated trials, as in a game of chance. He views his inference problems as matters of routine, and tries to devise procedures that will work well in the long run. Elements of personal judgment are as far as possible to be excluded from statistical calculations. Admittedly, a statistician has to be able to exercise judgment, but he should be discreet about it and at all costs keep it out of the theory. In fact, orthodox statisticians show a great diversity in their practice, and in the explanations they give for their practice; and so the above remarks, and some of the following ones, are no better than crude generalizations. As such, they are, I believe, defensible. [Perhaps it should be explicitly said that Fisher, who contributed so much to the development of the orthodox school, nevertheless holds an unorthodox position not far removed from the Bayesian; and that some other orthodox statisticians, notably Wald, have made much use of formal Bayesian methods, to which no probabilistic significance is attached.]

The revived interest in Bayesian inference starts with another posthumous essay, on "Truth and probability," by F. P. Ramsey[2] (1903-30), who conceived of a theory of consistent behavior by a person faced with uncertainty. Extensive developments were made by B. de Finetti and (from a rather different point of view) by H. Jeffreys. For mathematical statisticians the most thorough study of such a theory is that of L. J. Savage[3,4]. R. Schlaifer[5] has persuasively illustrated the new approach by reference to a variety of business and industrial problems. Anyone curious to obtain some insight into the Bayesian method, without mathematical hardship, cannot do better than browse in Schlaifer's book.

The Bayesian statistician attempts to show how the evidence of observations should modify previously held beliefs in the formation of rational opinions, and how on the basis of such opinions and of value judgments a rational choice can be made between alternative available actions. For him "probability" really means probability. He is concerned with judgments in the face of uncertainty, and he tries to make the process of judgment as explicit and orderly as possible.

It seems likely that during the coming years there will be a change amounting to a revolution in statistical methodology. Methods currently in use will be modified or reinterpreted. Theoretical concepts will be greatly altered. A just appreciation of the situation can only be had by studying the orthodox and the Bayesian approaches to a variety of statistical problems, noting what each one does and how well it does it. Such a study will show, I think, a diversity of relative effectiveness, according to the type of problem considered. When what is at issue is the choice of a decision procedure, to be used impartially in a routine way (as for example a sampling inspection plan operated by a Government agency), the analysis made by the orthodox statistician is capable of being good and cogent; the Bayesian statistician will accept this analysis and will add only a little to it. On the other hand, when the problem is one of unique intelligent decision (such as, should this new idea be actively developed, or should it be shelved?), it is not clear that the orthodox statistician's analysis has much cogency; often only the Bayesian can illuminate and assist the workings of common sense.

A Problem in Marketing

The following example is designed to illustrate the difference between the orthodox and Bayesian approaches. It has been shorn of complexities, so that it is not too reminiscent of the real world, but the comparison it suggests is, I believe, fair.

An executive must decide whether or not his company shall place a certain new product on the market. Its possible appeal is to a limited specialized class of consumers,

* Based on a talk given to the Chicago Chapter of ASA, April 4, 1960. I was much helped in the writing by H. V. Roberts, and subsequently received valuable comments from R. Burges, D. R. Cox, T. Dalenius, W. H. Kruskal, P. Meier, L. J. Savage, J. W. Tukey and D. L. Wallace.

Research was carried out at the Statistical Research Center, University of Chicago, under sponsorship of the Logistics and Mathematical Statistics Branch, Office of Naval Research. Reproduction in whole or in part is permitted for any purpose of the United States Government.

of whom he has a complete list. He has carefully studied the economics of the whole matter. He has determined that if more than 10 per cent of his list of potential customers will in fact be interested in the product, then the company will do well to market it, but that if fewer than 10 per cent of potential customers are interested his company should not market it. The proportion of potential customers who will be interested is the only important feature of the situation which he has not been able to ascertain, and he believes that the profit will be linearly related to this, i.e., the incremental (or marginal) profit will be constant.

Before he makes his decision, the executive has the opportunity to make contact with a random sample of the potential customers and to inquire of them whether they will be interested in the new product if it is made available. Let us suppose that the answers obtained are regarded as perfectly trustworthy, so that the proportion of favorable answers differs only by ordinary sampling fluctuation from the proportion of the whole class of potential customers who will be interested. Let us denote the latter proportion by p, let the sample size be n, which we shall suppose to be only a small fraction of the total number of potential customers on the list, and let the number of favorable answers received in the sampling inquiry be r. (Of these three symbols, p stands for an unknown quantity, but n and r are observed.) It is clear that if r/n turns out to be somewhat higher than 0.1 he will decide that p is probably greater than 0.1 and he ought to market the product, whereas if r/n turns out to be somewhat less than 0.1 he will decide that p is probably less than 0.1 and he ought not to market it. Given the value of n and all the background information, there is presumably some critical (whole) number c, not greatly different from $0.1n$, such that if r turns out to be greater than or equal to c he will judge it wise to market the product, but if r is less than c he will decide against marketing. How can he best choose c?

Orthodox Analysis

Suppose that he consults an orthodox statistician—one who by good fortune is not only orthodox but intelligent too. The statistician will begin by inquiring into the economic situation and will elicit the information outlined above. He will then impart some information, as follows. Given any values of n and c, it is possible to calculate the chance that the number of favorable responses in the sample will be greater than or equal to c. Calling this $F(p)$, we have

$$\text{ch}\ \{\ r \geqslant c\ \} = F(p) = \sum_{i=c}^{n} \binom{n}{i} p^i\ (1-p)^{n-i}.$$

[The orthodox statistician will be likely to use the word "probability" rather than "chance," but as his notion of probability is derived from contemplating the phenomena of simple games of chance, flipped coins, rolled dice, spun roulette wheels, etc., and he disbelieves in any other (logical or personal) concept of probability, I here prefer the term "chance," abbreviated "ch."]

Suppose for example that n=25 and c is chosen equal to 1. Then $F(p)$, which is the chance that the new product will be marketed, can be graphed against p, as shown in Fig. 1. Similar curves can be drawn for other values of c, such as 2,3,4,5, as also shown.

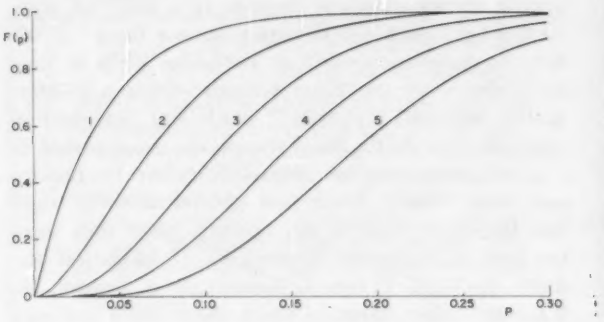


FIG. 1

Now if in fact $p > 0.1$, the new product ought to be marketed, but the chance is $1-F(p)$ that $r < c$ and the decision will go against marketing. Incremental profit being assumed constant, the wrong decision will cause a net loss of revenue proportional to $(p-0.1)$. On the other hand, if $p < 0.1$ the new product ought not to be marketed, but there is the chance $F(p)$ that $r \geqslant c$ and the decision will be for marketing. This wrong decision will cause a net loss of revenue proportional to $(0.1-p)$. The expected loss of revenue from wrong decisions is thus proportional to

$$\begin{cases} (p-0.1)\ \{\ 1-F(p)\ \} & \text{if } p > 0.1, \\ (0.1-p)F(p) & \text{if } p < 0.1. \end{cases}$$

Graphs of expected loss are shown in Fig. 2. It will be seen that when $p < 0.1$, the larger c is the smaller are the expected losses, but when $p > 0.1$, the smaller c is the smaller the losses. (Note that the word "loss" is used here exclusively to mean loss of revenue caused by a wrong decision; it does not mean negative profit.)

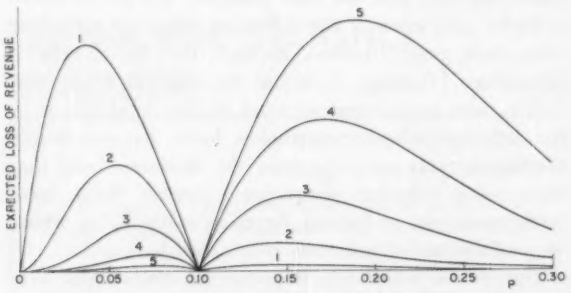


FIG. 2

As a compromise, designed to cope with both of the possibilities that p may be greater than 0.1 and less than 0.1, the statistician will point out the advantage of choosing c equal to 3, as the expected losses have then the least upper bound. This is easily shown to be related to the fact that $F(0.1)$ is close to $\frac{1}{2}$. The statistician

may very well suggest a general rule for choosing c, for any given n, namely

RULE A: *Choose c so that as nearly as possible* $F(0.1) = 0.5$.

At the "break-even" value for p, namely 0.1, when it is a matter of indifference which decision is made, there should be equal chances of marketing and not marketing. Then if p is better than the break-even value, the chance of marketing will exceed $\frac{1}{2}$, and if p is worse, the chance will be less than $\frac{1}{2}$. [Rather than Rule A, the statistician may propose directly that the minimax principle be adopted. I have preferred Rule A as being a little simpler to think about. For present purposes the difference is negligible.]

Now all this discussion has been in terms of chances, and the executive may well ask, what have chances got to do with the problem? He is not, after all, playing roulette. The statistician will tell him that he is basing a decision on a random sample, and that *is* rather like playing roulette. In fact, the statistician's recommendations amount to a policy of play, rather like the betting policy of an inveterate gambler—or better, the betting policy of an insurance company. Chances mean relative frequencies of occurrence in a long series of trials. Expected losses mean average losses over such a long series. If the executive had to make a long sequence of decisions about different products, the break-even value for p and the value of n being always the same, then by following the statistician's policy he could be sure that, whatever values of p might occur, his average loss of revenue from wrong decisions would not be very large (compared with what it might be for other values of c), the worst it could be being as low as possible. Thus in a sense the policy is prudent. Moreover, since decisions are based directly on the sample evidence and not at all on any private hunch the executive may have about the product, the policy has a judicial impartiality—useful if the executive is at loggerheads with his board of directors or under fire from other executives in the company.

If indeed the executive had a series of decisions to make, routine-fashion, and if impartiality were any asset, the statistician's arguments would be much to the point. Most likely, however, the executive will feel that the various decision problems that he encounters are all qualitatively somewhat different from each other, that they all need to be considered individually on their merits, and that it is not wise to follow rules of thumb. With luck he is *not* at loggerheads with the board of directors, and does not have to spell out reasons for his decisions; on the contrary, he is expected to act boldly and imaginatively. The statistician's arguments seem no longer very cogent. If n is large, say 1000 or more, r/n will be likely to be so near to p that Rule A seems very reasonable. But what if n is small?

Suppose $n = 2$. It is now impossible to implement Rule A as it stands. If $c = 0$, $F(0.1) = 1$. If $c = 1$, $F(0.1) = 0.19$. If $c = 2$, $F(0.1) = 0.01$. If $c > 2$, $F(0.1) = 0$. These are all the possibilities. At this point the statistician may possibly come out with a suggestion that was on the tip of his tongue when he first mentioned Rule A, namely to ensure that $F(0.1) = \frac{1}{2}$ by following a randomized procedure. The executive should now equip himself with a bowler hat and eight ping-pong balls, of which five have been dyed with red ink and the other three with green ink. Then he should examine the results of the sample inquiry. If one or both of the answers are favorable he should decide to market the product. If neither answer is favorable, he should shake the hat up and draw out one ball without looking, and be guided in the obvious way by its color.

Let us push the matter to the extreme and suppose $n = 0$. How should the executive decide when he has no sample evidence to go on? The randomized version of Rule A now says he should decide by flipping an ordinary coin. This procedure is fair, impartial and eminently "objective." An executive who followed it would not keep his job long.

So while Rule A makes good sense if n is large, it makes nonsense if n is small enough. A good orthodox statistician recognizes this, of course. Rather than push Rule A to the absurd extreme, he will be likely to say that if n is very small or zero no impartial rule can be recommended, and the executive should decide the matter unaided, as his common sense dictates.

More Orthodox Analysis

The above analysis has presented the orthodox point of view in the most favorable possible light. It makes some sense, plenty of sense in its way, but it solves the wrong problem.

Many orthodox statisticians would solve an even wronger problem. Skeptical of economic assessments, disbelieving there can be such a thing as a break-even value for p, blinded by a particular tradition, they would pervert the whole thing into a significance test. They would ask the executive: what is the lowest value for p such that you would much rather decide in favor of marketing—what value for p is too good to miss? He will reply, perhaps, that if $p > 0.15$ he would certainly like to know about it. The statistician will now take 0.15 as an Acceptable Quality Level or Null Hypothesis and dream up an associated Producer's Risk or Error Rate of 5 per cent (or maybe 10 per cent or 1 per cent, there is no knowing what), and he will then enunciate

RULE B: *Choose c so that as nearly as possible* $F(0.15) = 0.95$ (*or* 0.90 *or* 0.99 *or whatever*).

Significance tests have, I believe, an essential and inescapable place in statistics. This isn't it. The less said about Rule B the better.

Bayesian Analysis

The Bayesian statistician will regard it as his function to assist the executive to make up his mind, and in particular to show how the evidence from the sample inquiry should influence the decision. He will begin by asking not only for the economic information we have already considered, but also about the executive's opinion of the value of p before he received the sample results. The

executive's knowledge of the market and the customers' needs may well be substantial; it should certainly not be ignored.

In order to keep the calculations as simple as possible, let us suppose that the executive believes that the sale of the new product will depend on a particular feature of the business done by the customers. If the situation is of one sort, then he expects that only about 2 per cent of his list of potential customers will be interested, but if the situation is different he expects that about 15 per cent of his list of potential customers will be interested. That is, he believes that p is either close to 0.02 or close to 0.15. Moreover, in the absence of the sample information, he thinks the first of these possibilities a good deal more likely than the second—he would think it fair to offer odds of 3:1 in favor of $p = 0.02$. Thus his prior probability distribution is approximately as follows:

$$\text{pr}(p = 0.02) = 0.75,$$
$$\text{pr}(p = 0.15) = 0.25.$$

[I write "pr" instead of "ch," because logical probabilities are referred to; not relative frequencies. More usually in a prior distribution the probability is distributed over more than two possible values of the parameters. This slightly complicates the ensuing calculations, without altering their essential character.]

The executive must decide between two actions, to market or not to market, let us say M and N. We can set out a table of proportional losses from wrong decisions, as follows:

	$p = 0.02$	$p = 0.15$
M	8	0
N	0	5

Thus when $p = 0.02$, it is better not to market. If the decision M is taken, the loss of net revenue, as compared with N, is proportional to $0.1 - p = 0.08$. Similarly when $p = 0.15$, M is the better decision, and the loss if N is taken is proportional to $p - 0.1 = 0.05$. [All that matters here is the ratios of differences in the columns of the table—how much difference it makes whether one decision or another is taken for a given value of p, as compared with differences for other values of p. We could just as soon work with a table of net revenue, rather than losses; and we can use any units we like, as long as we are consistent about it.]

Now if there is no sample information ($n = 0$), we can calculate the expected loss if M is taken,

$$L(M) = 8 \times \text{pr}(p{=}0.02) + 0 \times \text{pr}(p{=}0.15) = 8 \times 0.75,$$

and the expected loss if N is taken,

$$L(N) = 0 \times \text{pr}(p{=}0.02) + 5 \times \text{pr}(p{=}0.15) = 5 \times 0.25.$$

The ratio of these expected losses is

$$\frac{L(M)}{L(N)} = \frac{8 \times 0.75}{5 \times 0.25} = 4.8.$$

Since this ratio is greater than 1, it will be wise to take action N—and no flipping of coins!

If sample evidence becomes available, the prior odds for 0.02 against 0.15 as the value of p are multiplied by the "likelihood ratio"

$$\frac{(0.02)^r(0.98)^{n-r}}{(0.15)^r(0.85)^{n-r}},$$

and so the ratio of expected losses becomes

$$\frac{L(M)}{L(N)} = \frac{8 \times 0.75 \times (0.02)^r(0.98)^{n-r}}{5 \times 0.25 \times (0.15)^r(0.85)^{n-r}}.$$

The likelihood ratio shows directly how the executive's prior opinion is changed by the sample evidence. The mathematical proposition used here is known as Bayes's theorem.

For example, suppose $n = 2$. Then the likelihood ratio is 1.33 if $r = 0$, 0.15 if $r = 1$, 0.018 if $r = 2$. The ratio of expected losses is 4.8 multiplied by the likelihood ratio, that is

$$6.4 \text{ if } r = 0,\ 0.74 \text{ if } r = 1,\ 0.085 \text{ if } r = 2.$$

Clearly he will prefer to take action N if he finds $r = 0$, M if $r = 1$ or 2. Most likely, whether $p = 0.02$ or 0.15, r will be found to be 0, and in that case the sample evidence will have left the decision unchanged—as was to be expected with so little sample information. However, if $p = 0.15$, there is an appreciable chance (about 0.28) that there will be at least one favorable response in the sample, and then decision M will be made.

Suppose now that $n = 25$. We find that the ratio of expected losses is

$$168 \text{ if } r = 0,\ 19.5 \text{ if } r = 1,\ 2.25 \text{ if } r = 2,$$
$$0.26 \text{ if } r = 3, \text{ etc.},$$

and the action N is preferred if $r \leqslant 2$, M if $r \geqslant 3$. If in fact $p = 0.02$, it is almost certain that the correct decision N will be taken, whereas if $p = 0.15$ the chance is about ¾ that the correct decision M will be made.

The larger n is, the more certain it is that the correct decision will be taken, and the Bayesian procedure approximates the orthodox statistician's Rule A. The decision effectively depends only on the sample information and the loss system. But if n is not very large the prior probabilities substantially influence the decision.

The Bayesian method is based on a theory of consistent behavior which in itself is attractive. Whenever, as here, the results of applying the Bayesian method can be easily compared with intuition and common sense, the agreement is good. One has confidence, therefore, in trusting the method in complex cases where common sense falters.

REFERENCES

[1] Bayes, T., "Essay towards solving a problem in the doctrine of chances," reprinted with bibliographical note by G. A. Barnard, *Biometrika*, 45 (1958), 293-315.

[2] Ramsey, F. P. *The Foundations of Mathematics*, London: Routledge and Kegan Paul, 1931.

[3] Savage, L. J., *The Foundations of Statistics*, New York: John Wiley, 1954.

[4] Savage, L. J. "Subjective probability and statistical practice," to be published in a Methuen Monograph.

[5] Schlaifer, R., *Probability and Statistics for Business Decisions: An Introduction to Managerial Economics Under Uncertainty*, New York: McGraw-Hill, 1959.

A NOTE ON THE DEMOGRAPHIC BASE OF HOUSEHOLD FORMATIONS IN THE 60's

ARTHUR G. AUBLE, Stanford Research Institute

The purpose of this note is to call attention to an interpolation procedure used in Bureau of Census illustrative projections of the number of households from 1960 to 1980.[1] The present writer turned to these series in order to estimate annual household formation rates in the 1960's. The data there indicate that the annual number of households formed might be very low in years ending July 1960, and July 1961, and might decline in 1965 and 1966. These figures for Series B, a medium high projection, are in the second column of Table 1. Note that the figures for 1960 and 1961 (less than 600,000) are substantially lower than the average rate in the three years ending March 1959 of about 840,000.[2] A different interpolation procedure indicates that annual household formation rates should not be particularly low in 1961 and that the number should rise rather smoothly from 1960 to 1970. Although widespread use has not been made of the annual figures that can be derived from the Bureau of Census publication, mention is made of the low formation rate just prior to 1962 in both an article in *Fortune* and the new book by Bogue.[3]

The Bureau procedure here was to project the total number of households that would be in existence in July of the years 1960, 1965, and 1970. Figures for intermediate years "were obtained through an interpolation process, in which preliminary figures were based on the assumption that the year-to-year *growth* in number of households would follow the same pattern as the *growth* in the number of men who are in the principal ages of first marriage (age 20 to 24); the final figures shown in Table 2 resulted from the application of a three-year moving average to these preliminary figures."[4] (Emphasis supplied.) It is the argument of this note that the number of households formed (the growth or first differences of the number of households in existence) is more closely correlated with the *number* of men age 20 to 24 than with the *growth* or first differences in the number of men in this age group. The argument is that, other things being equal (particularly the relative portion of men in each single year of age within the group), there will be more marriages out of a large group of men age 20 to 24 than out of a smaller group.[5] As a matter of fact, the number of men in this age group increases each year from 1960 to 1970 and, other things remaining equal, we should expect a larger number of marriages in each year.[6] (The *first differences* in number of men in this age group increase and decrease so widely over this period, that it is not surprising that a three-year moving average had to be applied in the Census interpolations.)

Interpolations from 1960 to 1970 based on the *number* of men in this age group are shown in the third column of Table 1. However, (1) the proportion of men at each year of age in the group 20 to 24 changes over this period and (2) the marriage rate at each single year of age varies greatly over even this small range. Therefore, a better basis for interpolation might be an annual series of estimated first marriages based on single year of age marriage rates, and population by single year of age. In connection with other work, the writer had made annual projections of first marriages and remarriages in the 1960's based on the number of females in each year by single year of age and on marriage rates by single year of age developed by Jacobson for 1948.[7] Approximately 66 percent of the total increase in new households from 1950 to 1965 is the increase in husband-wife house-

Table 1

ALTERNATE METHODS OF ESTIMATING ANNUAL HOUSEHOLD FORMATION RATES

(In Thousands)

	Bureau of Census household projections, Series B *		Increase in households over previous year with interpolation based on:	
July	Number of households	Annual increase over previous year	Number of men age 20-24	Number of first marriages
1959	51,280			
1960	51,877	597		
1961	52,424	547	786	781
1962	53,253	829	801	814
1963	54,227	974	829	836
1964	55,224	997	876	867
1965	56,076	852	907	901
1966	56,966	890	902	934
1967	57,960	994	929	971
1968	59,127	1,167	1,016	1,005
1969	60,079	952	1,058	1,041
1970	61,094	1,015	1,113	1,067

* United States Bureau of the Census, "Illustrative Projections of the Number of Households and Families: 1960 to 1980," *Current Population Reports, Population Characteristics, Series P-20*, No. 90, December 19, 1958, p. 2.

holds. Therefore, the number of first marriages should be a good measure of this major contribution to the annual increases in households. The annual number of first marriages has been used in arriving at the annual increase in households shown in the last column of Table 1.

Although there is fair agreement between the last two columns, they diverge from 1965 on. This divergence is partly explained by the very sharp increase in births in the year ending July 1946, which produces a moderate rise in 1964 in the marriage series, based on females, when a large group of women reach the modal age of marriage of 18. The number of males aged 20 to 24 does not reflect this increase until two years later. Therefore the interpolations based on these two different series are somewhat different. It is interesting to speculate on the age-at-marriage pattern that will develop in the mid 1960's. The present typical bride-groom difference in age of about three years for median age at first marriage may be modified as the sharp increase of females age 18 in 1964 is not matched by a sharp increase of males age 21 until three years later.

In summary: Other social and economic considerations are affecting the current rate of household formation and will continue to do so in the years ahead. However, the underlying demographic base is such that, these other factors remaining constant, there should be as many households formed in the year ending July 1962 as in the previous year and the annual formations should increase rather smoothly through the 1960's.

[1] United States Bureau of the Census, "Illustrative Projections of the Number of Households and Families: 1960 to 1980," *Current Population Reports, Population Characteristics, Series P-20*, No. 90, December 29, 1958.

[2] United States Bureau of the Census, "Households and Families by Type: 1950 to 1959," *Current Population Reports, Population Characteristics, Series P-20*, No. 94, August 24, 1959, p. 1.

[3] "In recent years the number of households, now about 51 million, has been increasing by an average of 850,000 a year. The Census Bureau anticipates that this figure will decline sharply in the years just ahead. The Bureau's 'medium-high' forecast shows the annual increase in households running at only aout 600,000 between now and 1961. Some such dip is almost certain to occur—principally because the next few years will be the last in which the 'hollow generation' born in the 1930's is coming of marriageable age, and because so many of the women in this generation have already married. But beginning around 1963, the forecast shows a dramatic increase in new household formation, with the annual gains running to a million in the remaining years of the 1960's, and total households reaching some 61 million by 1970." Daniel Seligman and Lawrence A. Mayer, "The Future Population 'Mix'," *Fortune*, LIX:94 (February 1959). In the book by Bogue, the annual formation rates are printed in a table with this observation in the text: "Beginning in about 1962, the rate at which new households are added each year will begin to rise rapidly." Donald J. Bogue, *The Population of the United States*, (Free Press, Glencoe, Ill., 1959), p. 772.

[4] United States Bureau of the Census, *op. cit.*, p. 2.

[5] This can be demonstrated simply as follows:

Let k_i = proportion of men age i who marry while at that age.

$P_{i,\,j}$ = population of males age i in year j.

Then the number of males age 20 marrying in year j, that is $M_{20,\,j}$ is k_{20}, P_{20} and . . .

$$M_{20,\,j} = \sum_{i=20}^{24} k_i,\ P_{i,\,j}$$

Net household formation is a function of both formations and dissolutions. If the latter are assumed to be rather regular over this period, and this is probably tacitly assumed by the Bureau of the Census, estimates of *gross* household formation are probably adequate for interpolation purposes.

[6] It might be suggested that household formations and marriages of the 1950's be compared with the absolute and first difference series of males age 20 to 24. (This, of course, is no test of the *a priori* soundness of the two methods.) From 1950 to 1956 the number of males age 20 to 24 declined very smoothly and then rose, the first differences following very smoothly from 1951 to 1954 and rising smoother thereafter. Marriages and household formation followed a similar pattern, reaching a low in 1954 and behaving very erratically after that. The turning point of marriages in this decade, which is marked by extremely smooth movements in number of males, coincides more closely with the turning point in the first difference series than with that of the absolute series. The amplitudes of decline from 1951 to 1954 are as follows: Marriages, — 6%; number of males, age 20-24, — 5%; first differences, number of males, age 20-24, — 232%; household formation, — 48%.

[7] Paul H. Jacobson, *American Marriage and Divorce*, (Rinehart & Co., New York, 1959), p. 80.

E. Douglass Burdick, 1905-1961

E. Douglass Burdick, Professor in the Department of Economic and Social Statistics of the Wharton School, University of Pennsylvania, died of a heart attack in Philadelphia, on January 17, 1961.

Dr. Burdick's professional life was extremely versatile, combining teaching, research and consulting activities. As a teacher of statistics at the University of Pennsylvania since 1930, he has left a lasting and powerful impression on his students and colleagues. He was one of those rare scholars who have the ability to take a generally accepted idea and to examine it from an unconventionally different point of view, raising new and provocative questions. However, he was not one who was satisfied merely to pose difficult questions; he criticized existing concepts by suggesting alternatives which invariably contained thoughtful and penetrating insights. His curiosity and enthusiasm for learning were contagious and continually inspired those who were fortunate enough to have worked with him or to have studied under him.

Professor Burdick engaged in consultation work in a wide variety of fields for research foundations, university organizations, private industry and governmental agencies. He directed a number of studies including a habitability survey for the Operational Development Force of the U. S. Navy and surveys on vacancy rates in habitable dwelling units in Philadelphia. The majority of his numerous publications were statistical studies in the fields of medicine and public health.

Professor Burdick's contributions were international in scope. He was on leave from the University of Pennsylvania from 1956 to 1959 as a Professor of Biostatistics employed by the International Cooperation Administration and assigned to Egypt. He later was transferred to India where he served as Advisor in Statistics to the Health Division of the Planning Commission of India. During the summer of 1960 he was a consultant to ICA in Turkey, stimulating research in problems of economic development and making recommendations to the government of Turkey on the reorganization of the Central Statistical Office. Shortly before his death, Dr. Burdick had been asked by the U. S. Economic Coordinator for Cento Affairs to be a member of the United States delegation to a conference to be held in the spring of 1961 in Tehran on the "Organization, Administration and Collection of Statistics for Development Planning."

Professor Burdick was a warm, kind and gentle human being who will always be remembered by those who knew him for his high ethical standards, the selfless manner in which he gave of himself, and his dedicated pursuit of a wide variety of worthy goals.

STATEHOOD AND NATIONAL STATISTICS

ROBERT C. SCHMITT, Hawaii State Planning Office

The granting of Statehood to America's two remaining incorporated Territories in 1959 called attention anew to the arbitrary, illogical, and inconsistent treatment of such areas in past national and State-level statistics. Alaska and Hawaii had been integral parts of the Union for more than sixty years, but, until their recent admission as States, these areas were almost universally omitted from national statistics. The reasons frequently given for their exclusion could well be questioned.

The new States were recognized by the Office of Statistical Standards on April 17, 1959, when it issued "guides to be used by all Federal agencies during the transition of Federal statistics from a 48-State to a 50-State basis, with the inclusion of Alaska and Hawaii . . ." Among other provisions, the guides directed the agencies to "use the term 'United States' to cover all States at the time to which the data apply and the District of Columbia, except for statistics covering periods prior to February 14, 1912. The term 'Continental United States' will no longer be used." All agencies were requested to "proceed immediately in changing the statistical series of national totals from a 48-State to a 50-State basis, starting not later than January 1, 1960, except where clearly infeasible." [1]

This belated acceptance of Alaska and Hawaii as parts of the American statistical universe reversed a long-standing attitude, both official and private, of disregard and rejection. Alaska was purchased from Russia in 1867, became an organized Territory in 1912, and was admitted as a State on January 3, 1959. Hawaii, previously an independent nation, was annexed by the United States in 1898, given Territorial status in 1900, and granted Statehood as of August 21, 1959. Most of the statistics issued for the United States during the past half-century have relegated the two Territories to a few lines at the bottom of the page (if, indeed, they were mentioned), and excluded them from the national totals.

Omission of outlying areas from United States census totals dates from the 1910 decennial count. As late as 1900, the seven Territories and Districts then in existence (Alaska, Arizona, Columbia, Hawaii, Indian Territory, New Mexico, and Oklahoma) received the same census treatment as the forty-five States and were included in the national totals. In 1910, however, the Bureau of the Census noted: "Unless otherwise expressly stated, the term 'United States,' wherever used, . . . is synonymous with the term 'Continental United States' . . . On account of the wide difference in conditions as between the United States as thus defined and its outlying possessions, it has been deemed best in general not to include statistics for the latter in the same tables with statistics for the former." [2]

Both public and private agencies accepted this limited concept of the nation. Tabulations published by the Bureau of Labor Statistics, Department of Agriculture, National Office of Vital Statistics, Office of Business Economics, and most other Federal agencies omitted Territories and possessions. The same policy was reflected in publications of private organizations, such as the American Medical Association, International City Managers Association, and Scripps Foundation for Population Research. Scholarly articles in professional and technical journals almost uniformly equated "the United States" with "the continental United States."

The decision to omit outlying areas sometimes was made on rather arbitrary grounds. The author of one of the monographs based on the 1950 U. S. Census, when queried on the omission of Alaska and Hawaii from his study, replied: "We were working with the continental United States and did not attempt to include any information on territories and possessions. You are probably right that the inclusion of such information would have been appropriate." The leading contributor to a group of studies in population distribution admitted that exclusion of data for Hawaii was "simply a slavish following of Census Bureau and National Office of Vital Statistics procedure. We tailor our series to the published 'National totals.' I heartily concur that these totals could just as easily include the Hawaiian Islands and Alaska as exclude them." [3]

Sometimes the decision was based on legal requirements or financial resources. The legislation mandating the 1947 Census of Manufactures, for example, failed to provide for the inclusion of outlying areas, with the result that the Bureau of the Census confined its efforts to the forty-eight States and District of Columbia. Even where a survey extended to non-continental areas—the 1950 Census of Housing was an example—the published national totals typically excluded outlying jurisdictions, and small-area tabulations presented less detail for Territories than for States. This practice was unofficially explained as an effort to conserve limited funds for a more comprehensive coverage of continental areas, by partial or complete deletion of data for outlying areas.

An even commoner reason for omitting Alaska and Hawaii from national totals was the impression that these areas somehow were different from the mainland States. The statement to this effect in the 1910 U. S. Census has already been cited. The author of a comparative study of metropolitan areas echoed this conviction when he ascribed the exclusion of the Honolulu and other non-continental Standard Metropolitan Areas to "some uncertainty as to how they should be treated. It was suspected, for example, that they might be affected by con-

ditions different from those obtained from the boundaries of continental U. S. A." Another student of metropolitan areas wrote that "Hawaii represents a special case because it is separated from the other metropolitan areas in the U. S. by some thousands of miles of water and therefore cannot and does not interact with these other areas on exactly the same basis as they interact with each other. . . . I have been hoping that both Hawaii and Alaska would be admitted to the Union soon but still am not sure that this would allow them to enter a homogeneous statistical universe of analysis."

The resulting elimination of the outlying areas from many primary surveys and censuses created still another reason for disregarding them in studies based on existing sources: the unavailability of data.

It is time that the logic behind this treatment be reviewed. Although the granting of Statehood has rendered the question moot in regard to current data for both Alaska and Hawaii, it has not solved the problem of historical series (for example, should national totals for earlier years be revised to include the newly-admitted areas), and it leaves unchanged the statistical status of the remaining outlying areas (such as Guam, American Samoa, Puerto Rico, and the Virgin Islands).

The use of geographic dissimilarity as a reason for omitting outlying areas is particularly in need of critical examination. Although parts of Alaska and Hawaii are indeed different from parts of the continental United States, such differences hardly seem sufficient to blackball them from the American statistical universe. A study of census tract data for the Honolulu Standard Metropolitan Area listed six respects in which it was geographically unique among American SMA's, yet concluded that the social and economic characteristics of the area "conformed closely to classical ecological models."[4] Visitors have remarked that most Hawaii communities are surprisingly similar to those in California, with residents differing less from their West Coast counterparts than Californians differ, say, from the people of Maine or Mississippi. Most of the available social, demographic, economic and housing statistics support this view.

The use of Statehood as a criterion for inclusion in national totals, implicit in some of the pronouncements reported above, has been singularly inconsistent. As noted earlier, seven Territories and Districts were included in the national totals for the 1900 U. S. Census, both Arizona and New Mexico Territories were included in 1910, and the voteless District of Columbia has never been omitted. The recent Bureau of the Budget decision to "use the term 'United States' to cover all States at the time to which the data apply and the District of Columbia, *except* for statistics covering periods prior to February 14, 1912" (when the forty-eighth State was admitted) seems jarringly illogical.[5]

Whatever the merit or wisdom of the foregoing considerations and practices, an important question remains: by omitting Alaska and Hawaii from national totals, have statisticians measured what they intended to measure?

National statistics are usually meant to show national potentials and needs. Population totals should indicate the magnitude of population resources and problems—the number of children of school age, the number of men of military age, the size of the labor force, and the number of persons eligible for Social Security benefits. National economic totals should be useful in charting income trends, sources for taxation, manufacturing potentials, and price differentials. Housing data for the nation are helpful in allocating urban renewal appropriations.

Oddly enough, the Territories have in most cases been part of the potentials and problems implied by these data, yet have seldom been incorporated into the statistical totals. Alaska and Hawaii have contributed (even disproportionately) to national manpower, both civilian and military, in time of war; they have paid more taxes than a number of the mainland States; their children have participated in the Federal school lunch program, and their older residents are eligible for OASI; their cities receive Federal grants for urban renewal and redevelopment. They are thus integral parts of the nation, contributing to both its resources and its problems. National statistical totals which exclude these outlying areas are thus incomplete, and fail to measure what they purport to measure.

The net effect of this tardy statistical recognition, in 1960 instead of 1898 or 1867, will be more important in some series than in others. National population totals, for example, would have registered relatively little change had the outlying areas been admitted statistically at the time of their physical, tax-paying annexation. Area and density data, in contrast, would have been altered considerably, as would the totals on pineapple production, salmon canning, and temperature ranges.

Although the foregoing discussion concerns a question now largely moot, it nevertheless points to a problem of continuing concern in statistical work. The treatment hitherto accorded Alaska and Hawaii in reality provides a case study in the psychology of statisticians, and the degree to which accessibility of data, casual (and frequently misbegotten) impressions regarding comparability, and "a slavish following" of past procedures may lead to offhand or arbitrary definitions of a statistical universe quite different from that required for the problems at hand. The need for consciously establishing the most meaningful universe, illustrated above and often disregarded, might well be pondered in other contexts as well.

In any event the following recommendations should be given serious consideration by all governmental agencies, private research organizations, individual statisticians, and other producers and consumers of national and state-level statistics:

1. All territories and possessions should hereafter be included in national totals.

2. Tabulations for smaller geographic units—states, counties, metropolitan areas, and cities—should report

(Continued on page 30)

QUESTIONS & ANSWERS

Devoted to discussions of conceptual and measurement problems . . . . . by ERNEST RUBIN, U. S. Department of Commerce and American University, Washington, D C.

Reader Observations on Recent Discussions

On "Pepys, Newton, and Probability" by Emil Schell (October 1960)

The following comment, an elaboration of the Pepys-Newton problem, by Franklin B. Evans was received December 2, 1960. Professor Evans is in the Graduate School of Business, University of Chicago.

Pepys, Newton, and Bernoulli Trials

Newton's difficulties in explaining the basic concepts of Bernoulli trials to Pepys is similar to the usual classroom problem. Even with boxes of colored marbles, fair coins, six-sided dice, and ten-sided random digit generators (ten-sided dice) the task is often difficult and frustrating. Newton's approach (without binomial tables, etc.) affirms his genius.

Like Schell one hopes that Pepys used the knowledge profitably but without further understanding of binomial probabilities Pepys easily could have been misled. Pepys' problem is the comparison of

$$B(X \geq 1 \mid 6,1/6) \text{ and } B(X \geq 2 \mid 12,1/6).$$

As Newton pointed out the first has the higher probability. The example though is unfortunate for one (Pepys?) is led to generalize from it to

$$B(X \geq 1 \mid N, P)\ B(X \geq 2 \mid 2N, P).$$

The generalization is false and would cause many wagers to be lost depending upon the selected statistics. The constant population proportion tells nothing about which side of the bet to take. In fact, the higher probability of winning can be determined only from looking at each individual case. The following examples illustrate how the choice will shift from 1 success in N trials to 2 successes in $2N$ trials at some point in each distribution.

$B(X \geq 1 \mid N, .50)$		$B(X \geq 2 \mid 2N, .50)$	
N	B	$2N$	B
2	.7500[1]	4	.6875
3	.8750	6	.8906[1]

$B\ (\geq 1 \mid N, .25)$		$B(X \geq 2 \mid 2N, .25)$	
N	B	$2N$	B
...	...	...	...
5	.7627[1]	10	.7560
6	.8220	12	.8416[1]

$B(X \geq 1 \mid N, .17)$		$B(X \geq 2 \mid 2N, .17)$	
(Closest in hundredths to a six-sided die)			
N	B	$2N$	B
...	...	...	...
7	.7286[1]	14	.7152
8	.7748	16	.7830[1]

$B(X \geq 1 \mid N, .10)$		$B(X \geq 2 \mid 2N, .10)$	
N	B	$2N$	B
...	...	...	...
12	.7176[1]	24	.7075
13	.7458	26	.7487[1]

[1] Better bet.

In each case illustrated, at some point where $N > \frac{1}{p}$ the more favorable side of the bet becomes 2 successes with the doubled sample. Let us hope that Newton (or Pepys' nephew) at least taught Pepys this much about the probability calculations.

* * * * *

Professor M. G. Kendall of the London School of Economics and Political Science, in a recent letter to me, wrote in part:

". . . This (the Pepys-Newton discussion) appears to have been written in ignorance of a very similar article by Dr. Florence David in the *Annals of Science*, Vol. 13, No. 3, September 1957. I enclose a copy of this article, herewith, and you will notice that it covers much the same ground as the article in the *American Statistician* . . ."

I am very grateful to Professor Kendall for bringing this article to my attention. Dr. David's informative piece "Mr Newton, Mr Pepys and Dyse: A Historical Note" is, as Professor Kendall noted, similar to our discussion. In addition, Dr. David considered certain peripheral aspects which go beyond the solution of Pepys' problem. Persons interested in the historical aspects of probability development will find Dr. David's contribution worthwhile and enjoyable.

* * * * *

On "The Age Factor in Master Chess" (December 1960)

The author of the following suggestive letter (December 16, 1960) is Hans Zeisel, who wrote *Say It With Figures*. He is Professor of Law and Sociology in the Law School, University of Chicago.

"When you give the mean age of the world champion at the time of his dethronement as 45, and that of the successful challenger as 33, these figures are meant to imply that it is this age difference which makes the challenger win and the champion lose, that prowess declines with age. While this might well be so, the data permit, at least theoretically, also of the interpretation that successive generations of challengers are ever better chess players, (like athletes breaking world records) and hence would have beaten the old champion even had he remained young. The issue, therefore, hinges partly on the answer to this question: Do the new generations of chessplayers play better chess irrespective of age? If so, also the other three tables in your article could be explained by that phenomenon.

"The difficulty arises from the absence of an *objective* performance measure such as track and field records provide. The situation, to remain in the realm of sports, is similar to the problem of comparing tennis masters, whose performance is also measured only in relative terms. Was Tilden beaten *only* because he got old or because there came a better tennis player who would also have beaten the young Tilden? The vision of Gonzales playing Tilden in his prime.

"Baseball, in this respect, ranks somewhere in between: there are objective performance records but they are comparable over time only to the extent to which one can assume that, for instance, it was as difficult to hit a ball pitched by Ty Cobb as it is now to hit one of Warren Spahn's."

* * * * *

Mr. Thomas F. Donlon of The Psychological Corporation of New York City offers, in his communication of December 19, 1960, some additional calculations and some plausible supplementary interpretations of my data.

"Dear Sir:

". . . To what extent is the decline in success of such masters as Lasker and Capablanca the result of the widespread publication and intensive study of their previous games over the years? In other words, is it more difficult for them to win because a once surprising attack is now recognized by the opponent as a variant of their basic style?

"I have computed from Mr. Rubin's tables the proportion of games lost over the age spans he considered, and find for Lasker and Capablanca it is as follows:

	LASKER			CAPABLANCA		
Age Group	Games Played	Games Lost	*p*	Games Played	Games Lost	*p*
20-29	102	11	.103	133	8	.060
30-39	53	4	.069	106	3	.028
40-49	36	3	.083	199	11	.055
50-59	59	3	.051	43	4	.093
60-69	66	9	.136	—	—	—
	321	30	.093	481	26	.054

"These data, together with Mr. Rubin's on the number of games drawn indicate that while it is much easier to draw with a master in his 50's, it is probably not any easier to win. It suggests to me that more opponents can cope with his attack, due to a much greater familiarity with it, and yet there is little change in his ability to defend.

"In offering these observations, I do not wish to suggest that aging has no effect on chess ability, but to hypothesize that the indices Mr. Rubin offers reflect other factors than mental deterioration."

In my discussion I refrained from assigning specific causes, e.g., "mental deterioration," as the probable substantive explanations congealed in the statistical data. Many chess masters refer to the importance of age as a factor in tournament play.

H. Golombek, the noted British master observed that

". . . the strain of modern tournament chess is very great, especially in the international field and age always deprives one of the stamina essential in such contests."[2]

Mr. Jack S. Battell, the Executive Editor of *Chess Review* recently wrote to me regarding the age aspect that he believes the

". . . incidence of ailments may be the real factor. The older the player the more likely he is to be ill, seriously or mildly but seriously enough to affect his play . . ."

* * * * *

I wish to thank the foregoing writers and Mr. Morton Raff of the Department of Labor, for their thoughtful comments, observations, and assistance.

[2] See Golombek's introduction to S. G. Tartakower, *My Best Games of Chess: 1931-1954* (G. Bell & Sons, Ltd., 1956, London).

STATEHOOD AND NATIONAL STATISTICS—CONTINUED FROM PAGE 28

data for territories and possessions in the same detail as for states.

3. Wherever sufficient data are available, historical series should be revised to include information for areas heretofore excluded.

NOTES

[1] Office of Statistical Standards, Bureau of the Budget, "Inclusion of Alaska and Hawaii in Statistical Series," *Statistical Reporter*, No. 256, April 1959, p. 61.

[2] Bureau of the Census, *Thirteenth Census of the United States . . . 1910. Abstract of the Census . . . with Supplement for Hawaii* (Washington: Government Printing Office, 1913), p. 21. See also the misleading "historical note" and references to "peculiar conditions prevailing in this insular territory," p. 567.

[3] The foregoing quotations, and others cited in this article, were taken from personal communications to the author.

[4] Robert C. Schmitt, "Illegitimate Birth Rates in an Atypical Community," *The American Journal of Sociology*, vol. LXI, no. 5, March 1956, pp. 476-477.

[5] *Loc. cit.* Italics supplied.

NATIONAL BUREAU OF ECONOMIC RESEARCH

An Announcement of Special Interest to Faculties and Students

The **Limited Faculty-Student Rate** of $5 a year entitles the subscriber to one copy of each Occasional Paper, Technical Paper, and the Annual Report, and to a 40 per cent discount on all books and other publications purchased. It is open only to faculty members and students of recognized educational institutions.

The **Special Rate** of $35 a year entitles the subscriber to one copy of each publication—books, Occasional Papers, Technical Papers, and the Annual Report—and to a 33 1/3 per cent discount on any other National Bureau publication purchased. It is open to faculty members and students of recognized educational institutions.

The **Standard Rate** of $75 a year, open to all, entitles the subscriber to one copy of each publication—books, Occasional Papers, Technical Papers, and the Annual Report—and to a 33 1/3 per cent discount on any other National Bureau publication purchased.

Address Inquiries to

NATIONAL BUREAU OF ECONOMIC RESEARCH, INC.
261 MADISON AVENUE NEW YORK 16, N.Y.

CHAPTER NOTES

Results of Chapter Survey

ASA Chapters have an average membership of 153 and a median of 73, hold an average of 8 meetings a year, with an average attendance of about 35, and charge their regular members an average of $1.85 in dues. These statistics are based on an analysis of the Chapters' answers to a questionnaire sent to them by the national office last fall. Thirty-two of the Association's 41 Chapters responded to the inquiry, which included questions on paid membership (national ASA and local only), number of meetings during the year, average attendance, annual dues, and approximate composition of membership and meeting attendance by type of member (government, business and industry, college faculty, student and other). The responses have been anaylzed by Edward F. Hornick, President of the Milwaukee Chapter, and Dana M. Barbour, News Editor of THE AMERICAN STATISTICIAN.

The New York Area Chapter is the largest, with a membership of 980, followed by Washington, D. C., with 852. The smallest Chapter among those reporting is Dayton, with a paid membership of 13. The third largest Chapter, Chicago, is the most active from the standpoint of number of meetings, with 16 luncheon meetings, 8 dinner meetings and the annual Midwest Conference.

The composition of the membership shows a wide variation among Chapters. As might be expected, government furnishes most of the members in Washington, D. C. and the state capitals. Business and industry members tend to predominate in New York, Chicago, Los Angeles (Southern California), Philadelphia, Detroit, Montreal and other large cities. In the college towns, membership consists mainly of faculty members. Student membership in the ASA is relatively small. Several Chapters, including San Francisco, Colorado-Wyoming and Connecticut, are more broadly based, with no one type of member predominating.

Dues varied from none to $5, with $2 the most common figure for regular members. A few Chapters set a lower rate for student members. Not all Chapters were able to report the number of their members who were also members of the national organization. It appears that most members of local Chapters belong also to the national Association; however, 13 Chapters reported that they had more local-only members than persons with combined membership.

Arizona

A dinner meeting was held jointly with the Central Arizona Chapter of the American Marketing Association on December 15th in Phoenix. The speaker was Charles Roumasset, Acting Regional Director, Bureau of Labor Statistics. Mr. Roumasset's subject was, "New Developments in Bureau of Labor Statistics Programs."

Newly-elected officers of the Arizona Chapter are:

President: NED SERRIO
Vice-President: CONSTANCE ALTSHULER
Secretary: JACK KEKAR
Treasurer: MARGO WALSH

Buffalo-Niagara

On October 24, 1960 the first meeting of the Buffalo-Niagara Chapter was held at Roswell Park Memorial Institute. Dr. Alfred Blumstein, Principal Operations Analyst and a member of the Technical Staff of the Operations Research Department at Cornell Aeronautical Laboratory, spoke on "Some Analytical Studies of Airport Capacity." Dr. Blumstein's central point was that the major bottleneck hindering airport traffic today is the limited capacity of airports to accept and dispatch airplanes. He supported his talk with some of his research in which he used analytical models to indicate the relative effects of the various system parameters (e.g., separation requirements, distribution of aircraft velocities) on the landing capacity and on the operations capacity of a runway. The conclusions derived from the use of the models indicate various promising means for increasing airport capacity.

The second meeting of the 1960-61 academic year was held in the Department of Statistics Laboratory at the University of Buffalo. A panel discussed decision theory. Mr. Arthur Stein, Head of the Tactical Warfare Branch, Operations Research Department of the Cornell Aeronautical Laboratories, moderated the panel. The members of the panel were, Mr. Charles Bicking, Manager of the Quality Control Branch, Research and Development Division, Carborundum Corporation; Dr. Irwin D. J. Bross, Chief of the Statistics Department, Roswell Park Memorial Institute; and Dr. Norman C. Severo, Associate Professor of Mathematical Statistics and Chairman of the Department of Statistics of the University of Buffalo. The panel discussed statistical decision theory based on its development as a set of principles unifying and perhaps superseding the various branches of statistical inference. It was pointed out that while the theoretical aspects of the topic had been rather thoroughly explored, relatively few of the concepts have been sifted down into practical statistical applications. Some of the problems and limitations of statistical decision theory were reviewed. The panel revealed that some of the excitement surrounding statistical design theory of a decade ago has somewhat cooled during the past decade and that basic statistical methodology still plays a dominant role.

The third meeting of the year featured as guest speaker Mr. Richard Bingham, Quality Control Manager, Coated Abrasives Division, Carborundum Company, Niagara Falls. Mr. Bingham spoke on "Survey of the Use of Statistics in the Chemical Industry." Mr. Bingham pointed out the limitations of time series, planned production data and the evolution of these data through correlation methods. He stated that in many cases the use of historical data does not permit nice evolution of the impact of various important variables that impinge upon the process. He went on to discuss more recent developments for evaluating the importance of these variables and related some of his experiences in production problems using evolutionary operations, response surface techniques and experimental designs for mixtures. The meeting was held December 19, 1960, at Roswell Park Memorial Institute.

Central Indiana

The subject of the dinner meeting held in Indianapolis on December 1 was "Economic Forecast for 1961." The speaker was Jack R. Wentworth, Director of Business Research at Indiana University; the discussant was Ronald P. Willett, Assistant Professor of Marketing, Indiana University.

The January 12th dinner meeting heard Robert R. Sturgeon, Department of Economics, Indiana University, and Virgil L. Anderson, Director of the Statistical Laboratory, Purdue University, speak on the Indiana Tangible Personal Property Tax Study. The goals and results of the study, as well as the statistical sampling and methods, were discussed. The Tangible Property Tax Study has been conducted jointly by Indiana and Purdue Universities for the State Board of Tax Commissioners.

Central New Jersey

At the meeting of January 17th, held at Princeton University, Mervyn Stone of Cambridge University, Visiting Professor, Department of Mathematics, Princeton University, was the speaker. Professor Stone's subject was, "Standardization of Tuberculin Hypersensitivity."

Chicago

A joint luncheon meeting with the Chicago Chapter of the American Marketing Association was held on November 3rd. Colston E. Warne, President of Consumers Union and a Professor of Economics at Amherst College, discussed "The Organized Consumer—His Impact on Marketing."

At the November 22nd luncheon meeting, Dr. Leonard Martin, Director of Research of the American Medical Association, spoke on the topic, "Limitations in the Measurement of Medical Care Costs."

The subject of the December 13th luncheon meeting was "Some Reflections on Federal Statistics." The speaker was George Stigler, Professor of Economics, University of Chicago, and Chairman of the Price Statistics Review Committee which recently conducted a study of Federal price statistics for the National Bureau of Economic Research and the Office of Statistical Standards of the U. S. Bureau of the Budget.

David Hardin, Executive Vice-President of Market Facts, Inc., and President of the Chicago Chapter of the American Marketing Association, was the speaker at the January 5th luncheon meeting. Mr. Hardin's subject was, "Where Is Marketing and Motivational Research Headed?" Luncheon participants were polled on the strong and weak points of market research.

A dinner meeting was held January 17th on the topic, "Can Federal Reserve Policy Stimulate Economic Recovery without Jeopardizing our International Gold Reserve?" Two noted economists, Dr. Frank W. Fetter, Professor of Economics at Northwestern University, and Dr. Beryl W. Sprinkel, Vice-President and Economist, Harris Trust and Savings Bank, were the speakers.

Cincinnati

At the November 17, 1960 meeting of the Cincinnati Chapter of the American Statistical Association, James Tumbusch reported on "An Application of Generalized Random Walks to Inventory Control," a joint paper by A. Gast, C. Muije, and J. Tumbusch.

Dayton

Dr. Mary Lum, Mathematical Statistician with the Aeronautical Research Laboratory, United States Air Force, spoke to the Dayton (Ohio) Chapter dinner meeting, December 8, 1960, held in the International Business Machines Building. Her subject was "Probabilities of Character Errors in Teleprinter Codes for Ternary Reception." This was a joint meeting with the local chapter of SIAM (Society for Industrial and Applied Mathematics).

Dr. Satya Dubey, Statistician with Procter & Gamble, Cincinnati, Ohio, addressed the Dayton Chapter at the prior dinner meeting, which was held on November 1, 1960, in the conference room of the National Cash Register Engineering and Research Building. His subject was "Dependent Random Variables and Statistical Decisions."

At the November meeting, Dr. Leon Harter, of the Aeronautical Research Laboratory, presented a summary of the ASA Annual Meeting, which had been prepared by Dr. Paul R. Rider, 1960 Chairman of the Section on Physical and Engineering Sciences of ASA and Past President of the Dayton Chapter, who attended the Stanford University conference.

Harrisburg

"The Prospects for Social Statistics" were discussed by Frederick F. Stephan, Professor of Social Statistics at Princeton University, at a meeting of the Harrisburg Chapter of ASA at noon Thursday, December 8, 1960, at Castiglia's Restaurant in Harrisburg.

After tracing the development of social statistics during the past 35 years, Mr. Stephan outlined some of the work still to be done. He said statisticians should:

1. Clarify the general objectives of their work and the particular purposes to be served by each major body of social statistics.
2. Clarify fundamental concepts and classifications.
3. Do more testing of the accuracy of their data.
4. Solve problems involved in combining social statistics with the results of intensive research studies and surveys.
5. Improve methods of estimating and adjusting data.
6. Increase their competence to keep pace with progress in the field.

Professor Stephan was introduced by Mr. Norman V. Lourie, Deputy Secretary of the Department of Public Welfare. The session was presided over by Dewey Boster, Chapter President.

Hawaii

After a two-months lapse during the summer, the Hawaii Chapter resumed its monthly meetings in September. The speaker at the September meeting was J. G. Darroch of the Hawaii Sugar Planters Association and the Pineapple Research Institute, which are getting the first IBM 1620 in the Islands. Mr. Darroch spoke on "Multiple Correlation Analysis."

In October, Robert C. Schmitt of the State Planning Office gave a talk, "A Statistician Looks at Tahiti," illustrated with slides which he took on a recent visit there.

The speaker at the December meeting was Robert Souza of the Honolulu *Star-Bulletin*. Mr. Souza spoke about the 1961 consumer analysis which h: is planning to conduct.

Milwaukee

The subject of the October 26th dinner meeting was "Effective Application of Statistical Methods." Dr. Charles Tobin, Market Research Director at Oscar Mayer, Madison, Wisconsin, was the speaker.

The December 6th meeting heard Alfred Nelson, Manager of Marketing Research at Bucyrus-Erie Company, discuss the topic, "Examples of the Application of Statistical Methods." At the December meeting, the following officers were elected for 1961:

President: NORMAN J. KAYE, Assistant Professor of Business Administration, Marquette University
Vice-President: JAMES B. SCHULTZ, Management Statistician, Milway, Inc.
Secretary-Treasurer: JOSEPH W. MCGEE, Associate Professor of Sociology, Marquette University
Recording Secretary: MRS. VIRGINIA KLECKA, Statistician, Chain Belt Company

A Chapter committee under Dr. Norman J. Kaye as Director is currently engaged in making a comprehensive survey of all courses in all branches being offered in the Greater Milwaukee area. The results of the survey will be made available to all interested persons.

Montreal

The 1960-61 season began with a talk by Mr. W. E. Duffett, Chief of the Dominion Bureau of Statistics, Ottawa. It was delivered at a luncheon meeting in the Mount Royal Hotel on October 12th.

The second meeting was held on November 9th and was addressed by Mr. W. A. Beckett, Professor of Economics and Statistics at the University of Toronto. His talk was entitled "The Use of Economic Indicators for Short Term Forecasting."

The December meeting took place on December 9th. Mr. W. J. Stenason of the Canadian Pacific Railway spoke on "A Statistical Analysis of Railway Cost."

The officers of the Montreal Chapter for the 1960-61 year are:

President: R. A. BANDEEN, Chief of Costs and Statistics, Research and Development Department, Canadian National Railways
Vice-President: DR. JACQUES ST-PIERRE, Center of Statistics, Department of Mathematics, University of Montreal
Secretary: J. A. COOMBS, Accounting Department, Bell Telephone Company of Canada
Treasurer: R. G. BELCHER, Canadian International Paper Company

New York

The Division of Statistical Techniques sponsored a meeting on November 1st on the subject, "Stationary Processes." The speaker was Madhav P. Heble, Columbia University.

The business outlook was the topic of the November 9th meeting, sponsored by the Business and Economics Division. Herbert Johnson, U. S. Economic Corporation, discussed the "Short Term Outlook for the U. S. Economy"; and Walter Sedwitz, Council of Foreign Relations, Federal Reserve Bank of New York, spoke on "Gold, International Economics, and the Business Outlook." The Chairman was Roger Williams, Luria Bros. Co.

On December 8th, the Physical and Engineering Sciences Division held a meeting at which the speakers were T. I. Peterson and H. Eisenpress, both of the Mathematics and Applications Dept., IBM. Mr. Peterson's subject was "Estimation of Non-Linear Parametric Relations"; Mr. Eisenpress', "Solution of Simultaneous Linear Stochastic Systems." Arthur H. Walner, Material Laboratory, N. Y. Naval Shipyard, was Chairman.

The new Collegiate Division held a special meeting on November 10th to plan a program for the coming year.

Pittsburgh

On October 11, 1960, Dr. Churchill Eisenhart, Director of the Statistical Engineering Laboratory, National Bureau of

Standards, spoke on "To Fit or Not to Fit, That is The Question". He showed that, in curve fitting, the most precise estimates of the true response may sometimes be obtained by intentionally fitting a polynomial of lower degree than that of the true relationship.

On November 10, 1960, Dr. R. Gnanadesikan of Bell Telephone Laboratories described "A Plotting Procedure in the Multivariate Analysis of Variance." This technique is a multivariate analogue of the half-normal plot used in the case of a single response.

The annual joint meeting with the Pittsburgh Section of the American Society for Quality Control was held on December 13, 1960. Dr. R. B. Murphy of Bell Telephone Laboratories presented "Some Problems in Interpreting the Results of Life Tests." The speaker showed how closely the choice of a model for a life distribution is tied in with the use to which the model is to be put.

A panel discussion was held on January 10, 1961, under the Chairmanship of Dr. Robert Hooke of Westinghouse Research Laboratories. The panel, consisting of W. H. Clatworthy (Westinghouse Atomic), D. C. McCune (Jones & Laughlin Steel), E. G. Olds (Carnegie Institute of Technology), and D. J. Thompson (University of Pittsburgh), discussed the nature and extent of statistical education that should be given to scientists and engineers, not statistically trained, who require such training. A variety of useful ideas was presented by both the panelists and the audience.

Rochester

The Rochester Chapter of the American Statistical Association met on October 4, 1960 to hear a talk by Dr. Donald Stokes of the Institute for Social Research, University of Michigan. Dr. Stokes spoke on "Election 1960." He discussed the independent voter, block voting, and the effects of mass media on voting. According to Dr. Stokes, voters feel varying degrees of identification with one political party or another. Particular elections will move weakly identified voters from one side to the other, but few voters are independent in the sense of having no political commitment of any kind. There is evidence that strongly identified members of a group such as union members, Catholics, Jews, etc. will tend to vote as a block when the interests of the group are involved. Mass media, on the other hand, seem to have no effect on voters' preferences. Dr. Stokes felt that the religious issue was of paramount importance in the 1960 presidential election.

The speaker for November was Dr. Robert R. France, an Associate Professor in the Department of Economics at the University of Rochester. Dr. France spoke on the "Growth of Real Wages in America." The first part of the talk covered the period from 1890 to 1932, when neither government nor unions had any pronounced effect on growth. The latter part of the talk dealt with the period from 1933 to the present.

Sacramento

The November 17, 1960 meeting was addressed by Dr. Don M. Gottfredson, Research Methods Consultant for the California State Department of Corrections. Dr. Gottfredson described a study which that agency is presently making of the role of base expectancies in the study of treatments. The three aims of this program are: (1) the development of a statistical prediction device for use as a tool in studying the effectiveness of treatments; (2) the identification of groups or classes which are quite likely to succeed when paroled; and (3) the improvement of clinical and statistical prediction techniques.

Saint Louis

A panel meeting on "The Outlook for 1961" was held on November 17th. The speakers were Professor Arthur C. Meyers, Jr., St. Louis University; Hugh Nourse, Economist, Roy Wenzlick and Company; and William H. Kester, Business Correspondent, the St. Louis *Post-Dispatch*.

The January 19th luncheon meeting heard William R. Bryan, Business Economist with the Federal Reserve Bank of St. Louis. Mr. Bryan's subject was "Simulation of Socio-Economic Systems", a newly-emerging research technique made possible by the advent of electronic computers.

San Francisco

A symposium on California's economic future was held at the November 23rd dinner meeting. The speakers were Max Kossoris, Regional Director of the U. S. Bureau of Labor Statistics; Howard Craven, Chief Economist, Bank of America; Carl Frisen, Chief Population Analyst, California State Department of Finance; and George S. Duggar, Bureau of Public Administration, University of California. The discussion centered around the problems of economic growth, demographic trends and governmental needs of California during the present decade.

Southern California

A dinner meeting was held on December 8th at which J. C. Faust, Assistant Zone Manager of the Chevrolet Division f General Motors, was the speaker. Mr. Faust's subject was "Examples of the Use of Statistical Data in the Distribution and Merchandising of Automotive Products."

The Southern California Chapter was one of the sponsors with the Los Angeles Chamber of Commerce of the 1961 Business Outlook Conference. This Conference, which was held at the Biltmore Hotel on January 11th, included sessions on the national economic outlook; the securities market outlook; the advertising, sales and marketing outlook; the finance, money and credit outlook; the national business outlook; the outlook for the Southern California economy; and the international outlook.

Virginia

The Virginia Academy of Science Chapter of the American Statistical Association held a joint meeting with the Richmond Section of the American Society for Quality Control in Waynesboro on October 29, 1960. A similar joint meeting with the Northeast Tennessee Section of the American Society for Quality Control was held in Marion on November 19, 1960. At each meeting, two papers were presented by members from each of the societies and were of an expository nature.

Washington, D. C.

The subject of the November 21st meeting was "Can Expectations and Intentions Surveys Improve Forecasting?" The speakers were Morris Cohen, *Fortune* Magazine, and Mona Dingle, Division of Research and Statistics, Federal Reserve Board. George Terborgh, Machinery and Allied Products Institute, and Joseph Clorety, Bureau of Labor Statistics, were discussants. The chairman was Murray Foss, Office of Business Economics, Department of Commerce.

The December 15th meeting was devoted to an election "post-mortem". Louis Bean discussed the "past behavior" approach to election forecasting; Paul Perry, Research Director, Gallup Polls, spoke on the "polling" approach; and William Dorfman, C.E.I.R. talked on the use of computers on election night. Albert Mindlin, District of Columbia Government, was chairman.

On January 12th, a joint meeting with the D. C. Sociological Society was held. Arnold M. Rose, Department of Sociology, University of Minnesota, spoke on the subject, "Statistical and Attitudinal Problems in Research on Negro Housing." Lawrence N. Bloomberg, Office of Statistical Standards, Bureau of the Budget, and Booker T. McGraw, Statistical Reports and Development Branch, Housing and Home Finance Agency, were discussants. The chairman was Paul C. Glick, Social Statistics Branch, Bureau of the Census.

The annual dinner of the Washington Statistical Society is scheduled for February 28th. It will be held at the Occidental Restaurant, and will be preceded by a social hour, starting at 6 o'clock. The principal speaker will be Martin Gainsbrugh, National Industrial Conference Board, and President of the ASA, whose subject will be "Economic Outlook and Data Needs for the Sixties". Raymond T. Bowman, Assistant Director for Statistical Standards, Bureau of the Budget, will be chairman.

PERSONAL NEWS—CONTINUED FROM PAGE 7

Office of Operations Analysis at Headquarters USAFE, Wiesbaden, Germany.

KENNETH HARWOOD, Professor of Telecommunications in the University of Southern California, has been elected President of the Southern California Conference of the American Association of University Professors.

MELVIN HENDRY, formerly a Census Programmer in the Economic Operations Division, Bureau of the Census, has accepted a position as Public Administration Advisor (Statistics) with the International Cooperation Administration, with the post of duty Monrovia, Liberia.

WILLIAM J. HICKEY, formerly a Mathematical Statistician in the Inspection and Control Branch of the Operations Control Office of the Department of the Army, has joined the staff of the Statistical Standards Division of the Agricultural Marketing Service.

WERNER Z. HIRSCH, Professor of Economics, Washington University, St. Louis, has joined the staff of the Statistics Division of the Internal Revenue Service as a consultant on regional projections of tax returns to be filed and the new statistical data on metropolitan area studies, which will be published in the Statistics of Income series.

PAUL J. HOFFMAN has resigned as Assistant Professor of Psychology at the University of Oregon to become Director of the Oregon Research Institute in Eugene, Oregon. The ORI is a nonprofit organization, dedicated to basic and applied research in the behavioral sciences.

SIDNEY A. JAFFE, Assistant Chief for Statistics, Division of Prices and Cost of Living, Bureau of Labor Statistics, was given the Meritorious Service Award of the Department of Labor "for his outstanding achievement in developing and obtaining acceptance of basic concepts and principles for the Federal Government's official price indexes involving advanced statistical techniques adapted to sound, practical operating procedures".

DOCK R. JARRELL is now employed by the Abbott Laboratories in North Chicago, Illinois as a Statistican (O.R.). The main duties of his position are to apply statistical and economic concepts to the company's operations.

MILDRED B. KANTOR has been appointed Director Vital Statistics in the St. Louis County Health Department. She has been a Project Director in the Department's Research and Development Division since 1955. She will continue her activities as a lecturer in Sociology at Washington University and Research Associate with the Social Science Institute, Washington University and as Assistant Program Director of the Training Program for Research in Community Mental Health, a joint project of the University and the Health Department, but will spend the major portion of her time in the Health Department position.

NATHANIEL R. KIDDER has accepted a position as Manager of Marketing Services with Jack & Heintz, Inc., in Cleveland.

FRANK KRISTOF, formerly Assistant Chief of the Housing Division, Bureau of the Census, has resigned to accept a position with the Housing and Redevelopment Board of New York City.

H. P. KUANG has joined the faculty of North Dakota State University at Fargo, North Dakota. Dr. Kuang is Professor of Mathematics and gives a course in mathematical statistics.

CHARLES B. LAWRENCE, JR. has joined the staff of the Census Bureau as Assistant Director (Operations). He transferred from his post as Deputy Assistant to the Secretary for Health, Education and Welfare following his return from Korea.

FRANK MEISSNER has accepted a teaching position in the Economics Department at San Jose State College. He continues as Consultant to Stanford Research Institute.

DONALD L. MEYER has been appointed as Assistant Professor of Education at Syracuse University, Syracuse, New York. He is teaching courses in educational statistics and consulting with faculty and students on research projects.

KENNETH E. MILLER has joined the University of Missouri with a joint appointment in the Bureau of Business and Economic Research and the Department of Agricultural Economics.

A. CARL NELSON, JR. is now a Statistician at the Research Triangle Institute, Durham, North Carolina. He was formerly with the Bettis Atomic Power Laboratory of Westinghouse Electric Corporation at Pittsburgh.

ELLIS B. PAGE, formerly with Eastern Michigan University, has accepted a new post as Dean of the College of Education and Professor of Education and Psychology at Texas Woman's (State) University in Denton, Texas.

ROBERT D. PARR is attending Graduate School at the North Carolina State College, Department of Experimental Statistics, under a training program started by the USDA Agricultural Estimates Division, Agricultural Marketing Service.

ABE ROTHMAN, Chief, Office of Statistical Standards, Bureau of Labor Statistics, was given a Distinguished Service Award by the Secretary of Labor "for his many contributions to the quality and effectiveness of the statistical programs and methods of the Department of Labor".

VIRGINIA SAWYER (Mrs. John A.), formerly of Carleton University, Ottawa, is now lecturing in Statistics in the School of Business, McMaster University, Hamilton, Ontario.

BENJAMIN J. TEPPING left for Korea, November 24, to be Chief of the Statistical Advisory Group, Surveys and Research Corporation. In this capacity, he will serve as Consultant on censuses of Korea and on other statistical programs. He is on leave from National Analysts, Inc., and the University of Pennsylvania.

MARGARET E. THOMAS, Office of the Secretary, was given a Distinguished Service Award by the Secretary of Labor "for extraordinary initiative and skill in developing and presenting factual manpower outlook information for use in stimulating public thinking toward wiser deployment of human resources".

MARVIN W. TOWNE has returned as a Price Economist to the Division of Prices and Cost of Living, Bureau of Labor Statistics, where he will participate in the program for revising the Consumer Price Index.

CARL E. VEAZIE is now employed as Economist for the Connecticut State Development Commission in Hartford.

DINO VILLA, formerly Chief of the Import Branch of the Foreign Trade Division, Bureau of the Census, has been named Assistant Chief of the Division.

MOREY J. WANTMAN has returned recently from three years in Malaya and is now with the Educational Testing Service in Princeton as Director of Advisory and Instructional Programs.

RAYMOND L. WILDER has recently accepted a position as Statistician with the Missile Department's Reliability Group of Douglas Aircraft Company, Inc.

HAL H. WINSBOROUGH was appointed Assistant Professor in the Department of Sociology and Anthropology at the Ohio State University on October 1, 1960.

HERMAN O. WOLD, Professor of the Statistical Institute at Uppsala University and a Fellow of the ASA, has been elected a member of the Swedish Academy of Sciences. He entered the class of economic, statistical and social sciences, a class that by now has seven members.

SEYMOUR L. WOLFBEIN, Deputy Assistant Secretary of Labor for Manpower, was given a Distinguished Service Award "for his highly significant contribution to national recognition of the key role of manpower development and utilization in the Nation's future".

THEODORE O. YNTEMA has been appointed Chairman of the Finance Committee of Ford Motor Company. He has been a Director since 1950 and Vice-President-Finance since 1949.

DUDLEY E. YOUNG, Assistant Chief for Industry Employment Statistics, Division of Manpower and Employment Statistics, Bureau of Labor Statistics, has been given a Department of Labor Career Service Award, which entitles him to several months of paid leave to study various methods of Federal-State cooperation in collecting statistical data, with an eye to finding the most efficient, most uniform and cheapest.

LETTER TO THE EDITOR

Dear Sir:

Permit me to note an objection to the proposal of William F. Tanner with regard to the use of the term "filtering" in statistics, as advanced in his article "Filtering in Geological Sampling" in *The American Statistician* for December 1960. The objection is simply this, that the terms "filtering" and "filter" have been applied by Norbert Wiener in a very specific and quite different sense to data arising in the physical sciences. These terms are in current use by statisticians working in the physical sciences, and it would be rather unfortunate if they were to be used in a conflicting sense by other statisticians.

Prof. Tanner's reasons for rejecting the term "censoring" do not strike me as extremely cogent. I believe the phenomena he describes could be brought within the concept of a censored distribution without undue strain. In defining "censoring" he says, "The missing data normally belong to one or both tails, but might conceivably be taken from the middle. *In most cases* the number of suppressed classes is known, or the total number of suppressed items is known, but measurements representing the individual items are not recoverable." (My emphasis.) Subsequently he states, "Filtering differs from censorship in that some of the information about only some of the items is missing, and further that it is not known how many items have been so affected." These two statements can be regarded as consistent only if the phrase "in most cases" is taken to mean "in all cases". On the basis of my own limited experience in this area, I should say that this interpretation would not be consistent with current practice.

If the term "censoring" meets strong objections from Prof. Tanner and his colleagues, perhaps introduction of the term "hypercensoring" might resolve the difficulty (the author generously waives all copyright privileges). Alternatively, since the situation seems to be a rather special one, involving not so much absence of observations as the specific removal of previously existing data, a rather special term should perhaps be chosen. For example, "excision" ("and excised distribution") or "intercision" ("an intercised distribution"). I am tempted to suggest "statistical erosion" ("an eroded distribution"), but I fear that physiographers might have the same kind of objection to this that physical scientists would have to "filtering".

In conclusion, let me make it clear that the speed of my reaction to Prof. Tanner's proposal is not to be regarded as evidence of strong feeling on the subject. Neither I nor anyone else is likely to be greatly injured, much less offended, if Prof. Tanner's proposal meets with widespread or even universal acceptance. The situation is, however, clearly one where the admonition "Speak now or forever hold your peace" is applicable, and I should hate to be accused of what the legal profession calls laches, at some later date.—THOMAS A. GOLDMAN.

8th Annual
Midwest Conference on Statistics for Decision

•

Pick-Congress Hotel
Chicago, Illinois

Co-Sponsored By The

CHICAGO CHAPTER AMERICAN STATISTICAL ASSOCIATION

And The

CHICAGO ASSOCIATION OF COMMERCE AND INDUSTRY

PLANNING for PROFITS

Friday, March 17, 1961

Plus

PLAYING A MANAGEMENT PLANNING GAME

Saturday, March 18, 1961

WATCH YOUR MAIL FOR ADDITIONAL DETAILS.

For Advance Information Contact: **JOSEPH H. RABIN, General Conference Chairman, Paper Mate Company, 444 Merchandise Mart, Chicago 54, Illinois.**

CHAPTER PRESIDENTS AND SECRETARIES

ALBANY—**Helen C. Chase,** *New York State Dept. of Health, 84 Holland Ave., Albany 8, New York;* **Elizabeth H. Christen,** *N. Y. State Dept. of Agr. and Mkts., State Office Bldg., Albany, N. Y.*

ARIZONA—**Ned Serrio,** *c/o IBM, 3424 North Central Avenue, Phoenix, Arizona;* **Jack Kekar,** *1811 E. Indian School Road, Phoenix, Arizona*

AUSTIN—**N. K. Woerner,** *Dept. of Public Safety, North Austin Station, Austin, Texas;* **P. John Lymberopoulos,** *Dept of Business Services, University of Texas, Waggener Hall 415, Austin 12, Texas*

BOSTON—**David Durand,** *52-480, Massachusetts Inst. of Technology, Cambridge 39, Mass.;* **John E. Alman,** *Office of Statistical Service, Boston University, 725 Commonwealth Avenue, Boston 15, Mass.*

BUFFALO-NIAGARA—**Alfred Blumstein,** *Cornell Aeronautical Laboratory, 4455 Genesee Street, Buffalo 21, New York;* **Norman C. Severo,** *Dept of Statistics and Insurance, University of Buffalo, Buffalo 14, New York*

CENTRAL INDIANA—**James A. Norton, Jr.,** *Statistical Laboratory, Purdue University, Lafayette, Indiana;* **H. Latham Breunig,** *Eli Lilly and Company, Indianapolis 6, Indiana*

CENTRAL IOWA—**Harvey N. Albond,** *City Plan and Zoning Commission, Des Moines, Iowa;* **Dale O. Richards,** *Dept. of Industrial Engineering, Iowa State University, Ames, Iowa*

CENTRAL NEW JERSEY — **William R. Allen,** *P. O. Box 574, Princeton, New Jersey;* **Stanley J. Pokempner,** *Mathematica, 92 A Nassau, Princeton 1, New Jersey*

CHICAGO — **Robert L. Seidner,** *Chicago* American, *326 W. Madison Street, Chicago 6, Illinois;* **Daniel L. Seiden,** *Swift and Company, 4115 S. Packers Ave., Chicago 9, Illinois*

CINCINNATI — **James T. Tumbusch,** *General Electric Co., Testing Operation, F.P.L.D., Building 305, Cincinnati 15, Ohio;* **Kenneth A. Busch,** *Robert A. Taft Sanitary Engineering Center, 4676 Columbia Parkway, Cincinnati 26, Ohio*

CLEVELAND—**Charles H. Joseph, Jr.,** *The World Publishing Co., 2231 W. 110th Street, Cleveland 2, Ohio;* **Morris Darnovsky,** *Market Research Services, 565 Hippodrome Bldg., Cleveland 15, Ohio*

COLORADO - WYOMING — **Harold A. Morse,** *3298 South Elm Street, Denver 22, Colorado;* **Donald N. Livingston,** *1644 South Ivy Way, Denver 22, Colorado*

COLUMBUS—**Roy L. Adams,** *274 West Kenworth Road, Columbus 14, Ohio;* **Mikhail C. Condoide,** *188 West 10th Avenue, Columbus 1, Ohio*

CONNECTICUT—**Hilary L. Seal,** *Dept of Zoology, Osborn Zoological Laboratory, Yale University, New Haven, Conn.;* **Mrs. Myrna Seal,** *Stochastic Calculations, Inc., P. O. Box 1814, New Haven, Conn.*

DAYTON — **John J. Stansbrey,** *314 Wisteria Drive, Dayton 19, Ohio;* **Mrs. Freda Witherow Kurtz,** *2654 North Gettysburg Avenue, Dayton 16, Ohio*

DETROIT—**Emanual A. Morse,** *Great Lakes Steel Corp., Tecumseh Road, Ecorse, Michigan;* **Gordon W. Lamphere,** *Assistant General Counsel, Federal Reserve Bank, Detroit 26, Michigan*

HARRISBURG — **Dewey O. Boster,** *Div. of Crop Reporting, Dept. of Agriculture, Room 25, South Office Bldg., Harrisburg, Pa.;* **Milburn L. Forth,** *331 Schuylkill Street, Harrisburg, Pa.*

HAWAII—**Paul T. Tajima,** *Real Property Valuation Engineer. Office of Territorial Tax Comm., Honolulu 13, Hawaii;* **Otto Orenstein,** *Hawaiian Telephone Co., P. O. Box 2200, Honolulu, Hawaii*

UNIV. OF ILLINOIS—**Thomas A. Yancey,** *Dept. of Economics, University of Illinois, 1007 S. Wright Street, Urbana, Ill.;* **Henry F. Kaiser,** *Bureau of Educational Research, 1007 S. Wright Street, Champaign, Illinois*

ITHACA—**C. R. Henderson,** *Department of Husbandry, Cornell University, Ithaca, New York;* **Philip J. McCarthy,** *New York State School of Industrial & Labor Relations, Cornell Univ., Ithaca, N. Y.*

MILWAUKEE—**Norman J. Kaye,** *College of Business Administration, Marquette University, Milwaukee 3, Wisconsin;* **Joseph W. McGee,** *Dept. of Sociology, Marquette University, Milwaukee, Wis.*

MONTREAL—**B. A. Bandeen,** *Research and Development Dept., Canadian National Railways, 360 McGill Street, Montreal, Que., Canada;* **James A. Coombs,** *The Bell Telephone Co. of Canada, Montreal, Que., Canada*

NEBRASKA—**Edgar Z. Palmer,** *Social Science Bldg., 310A, University of Nebraska, Lincoln 8, Nebraska;* **Charles O. Gardner,** *Dept. of Agronomy, University of Nebraska, Lincoln 8, Nebraska*

NEW ORLEANS—**Roland Pertuit,** *4871 Metropolitan Drive, New Orleans, Louisiana;* **Elsie M. Watters,** *School of Business Administration, Tulane University, New Orleans, Louisiana*

NEW YORK—**Robert E. Lewis,** *Economics Department, First National City Bank of N. Y., New York 15, N. Y.;* **Sidney Sameth,** *Union Health Center, 275 7th Avenue, New York, New York*

NORTH CAROLINA—**Bernard G. Greenberg,** *Dept. of Biostatistics, School of Public Health, University of North Carolina, Chapel Hill, North Carolina;* **Roy R. Kuebler, Jr.,** *Dept. of Biostatistics, University of North Carolina, Chapel Hill, North Carolina*

NORTH TEXAS—**Leroy Folks,** *713 Sherwood, Richardson, Texas;* **Alex Songayllo, Jr.,** *2826 Garapan Drive, Dallas 24, Texas*

PHILADELPHIA—**Stanley Schor,** *Statistics Dept., University of Pennsylvania, Philadelphia 4, Pennsylvania;* **Frederick N. Sass,** *6418 Lawnton Avenue, Philadelphia 26, Pa.*

PITTSBURGH—**Philip Hermann,** *Jones & Laughlin Steel Corp., #3 Gateway Center, Pittsburgh, Pa.;* **Frederick A. Sorensen,** *U. S. Steel Corporation, Applied Research Laboratory, Monroeville, Pa.*

PUERTO RICO—**Alvin Mayne,** *2169 Calle Gen Del Valle, Santurce, Puerto Rico;* **Amadeo Francis,** *Puerto Rico Economic Association, Santurce Building, 4th Floor, Santurce, Puerto Rico*

ROCHESTER, N.Y.—**Donald A. Wright,** *Paper Service Div. B-57, Eastman Kodak Co., Kodak Park Works, Rochester, N. Y.;* **Richard N. Rosett,** *Dept. of Economics, University of Rochester, Rochester, N. Y.*

SACRAMENTO — **Edmond A. Radsliff,** *State of Calif. Division of Highways, Sacramento, California;* **Clark A. Lee,** *Franchise Tax Board, 1025 P Street, Sacramento 12, California*

SAN FRANCISCO—**Roy C. Cave,** *Dept. of Economics, San Francisco State College, San Francisco, California;* **Roderick E. MacIver,** *California Economic Development Agency, 231 World Trade Center, San Francisco 11, California*

ST. LOUIS—**George S. Little,** *Southwestern Bell Telephone Co., 1010 Pine Street, St. Louis 1, Missouri;* **A. J. Meigs,** *Federal Reserve Bank, P. O. Box 442, St. Louis 66, Missouri*

SOUTHERN CALIFORNIA — **William V. Henderson,** *The Pacific Telephone and Telegraph Co., 740 S. Olive Street, Los Angeles 55, California;* **Kenneth G. Spiker,** *City of Los Angeles — City Council, Los Angeles, California*

STATE COLLEGE, PA. — **Robert W. Kautz,** *School of Business, Pennsylvania State University, University Park, Pennsylvania;* **George G. Burgess,** *R. D. Box 543-3, State College, Pennsylvania*

TULSA—**Lyndral E. Marcum,** *Blue Cross, Blue Shield Hospital & Physician Service, P.O. Box 1738, Tulsa, Oklahoma;* **Marshall E. Milligan,** *Stanolind Oil and Gas Co., Tulsa, Oklahoma*

TWIN CITIES, MINN.—**Harold J. Gulde,** *5917 Chowen Avenue South, Minneapolis 10, Minnesota;* **Mrs. Vida G. Hildyard,** *Remington Rand Univac, Univac Park, St. Paul 16, Minnesota*

VIRGINIA—**James Armstrong, Jr.,** *E. I. du Pont de Nemours & Co., Inc., P. O. Box 1477, Richmond 12, Virginia;* **William A. Glenn,** *Dept. of Statistics, Virginia Polytechnic Institute, Blacksburg, Virginia*

WASHINGTON, D. C.—**Paul F. Krueger,** *Office of Statistical Standards, Bureau of the Budget, Washington 25, D. C.;* **Albert Mindlin,** *Dept. of General Administration, D. C. Government, 14th & E Streets, N.W., Washington 25, D. C.*

$r_{1.23} = 1.00$
= RCA IN FLORIDA

RCA SERVICE COMPANY
A DIVISION OF RADIO CORPORATION OF AMERICA

MATHEMATICIANS—STATISTICIANS
equate perfection with

1. **Exciting assignments at Cape Canaveral**
2. **Opportunity for professional advancement**
3. **Pleasant, relaxing Florida living**

IF reliability, validity, and error systems analysis are challenging to you . . .

IF advancing the state of the art in data processing techniques is intriguing to you . . .

IF you've been looking for the "different"—the ultimate in a professional position . . .

IF your field is: Operations Analysis . . . Mathematical & Statistical Techniques . . . Astronomy . . . Computer Applications or Computer Programming . . .

THEN you belong with RCA at Cape Canaveral, Florida! You can make the move *right now* . . . by contacting:

Mr. W. F. Marquette
Professional Placement Director
RCA Service Company, Dept. N-43
Atlantic Missile Range
Mail Unit 114
Patrick Air Force Base, Florida

EQUAL JOB Opportunity

RESEARCH STATISTICIAN

CHALLENGING position in advanced experimental and applied statistics group for Research Statistician with Ph.D. or equivalent training.

Biologically-oriented work provides opportunities for both theoretical and applied statistics, as well as direct consulting with pharmacologists, clinicians, biochemists, and members of other scientific disciplines of the pharmaceutical industry.

Maximum time is made available to the Research Statistician for creative effort by providing him with capable statistical assistants and computer facilities.

Liberal employee benefit program includes comprehensive health insurance and financial assistance toward further education.

Please send detailed personal history, including salary requirements, to:

DR. S. M. FREE, JR.
RESEARCH AND DEVELOPMENT DIVISION
SMITH, KLINE & FRENCH LABORATORIES
1542 Spring Garden Street
Philadelphia 1, Pennsylvania